A Study of Oral Turmaric Power on The Level of Marker of Chronic Inflammation and Glycosylated Hemoglobin

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Abstract

Now a day chronic diseases are the big problem in the world. And we know that the underlying cause is chronic inflammation. Turmaric is the herbal that used to help in treatment of many diseases for a long time. Curcumin is the active ingredient in Turmaric that we have known for inhibit many inflammatory pathway so that it can help to prevent chronic inflammation and chronic diseases

We have studied on the consumption of the Turmeric power, for the result in the decreasing level of chronic inflammation (hs-CRP) and Glycosylated hemoglobin (HbA1c). The result show that consuming the Turmeric powder with the enhancement formula which stimulated the absorption rate (added some black peppers in the ratio of 20:1) in the 12 weeks' time; it actually help to reduce hs-CRP and HbA1c but didn't increase on the liver enzyme (no increased of the SGPT level).

The study process was called a Prospective Clinical Trial. It was done by observing and studying on a sample group in of 46 people with the Metabolic Syndrome who lived in Suratthani Province area. The sample group was given to consume the Turmeric powder for 12 weeks continuously. They were tested on the level of their hs-CRP, HbA1c and SGPT in blood before and after the consumption of the Turmeric; the results were analyzed by the Pair-T-Test statistic.

The result after studying show that after consuming the Turmeric power for the 12 weeks, the hs-CRP and HbA1c levels in blood of the sample group were decreased significantly ($p< 0.05$) but didn't increase in the level of liver enzyme. In additional, SGPT level had also decreased significantly.
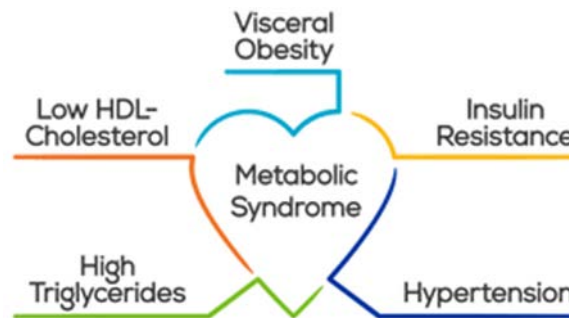
Key words : Turmaric, Curcumin, hs-CRP, HbA1c,SGPT

Introduction

Now a day world population are faced from chronic diseases like Hypertention, Cardiovascular diseases, Stroke, Diabetes, GI problem, Alzheimer, Arthritis, Chronic lung diseases , Immune diseases and Cancers etc. We know that the causes of these diseases are influence from chronic inflammation or oxidative stress that come from modern life style and bad food we have consumed. (Reuter,S.,et al., 2010, Schraufstatter,I.,et al.,1988) According to WHO in the year 2005 around 60% of world population died from chronic diseases. (Global status report on non-communicable diseases 2014) From the report of minister of health of Thailand in the year 2012 to 2015 found that the rate of Heart disease in Thailand

increase continuously. In the year 2014 about 58,681 patients died from heart and vessel diseases and in the year 2015 about 130,942 patients went to emergency room with Heart disease.(National Institues of Heath News, Post Today 14th Feb,2016)
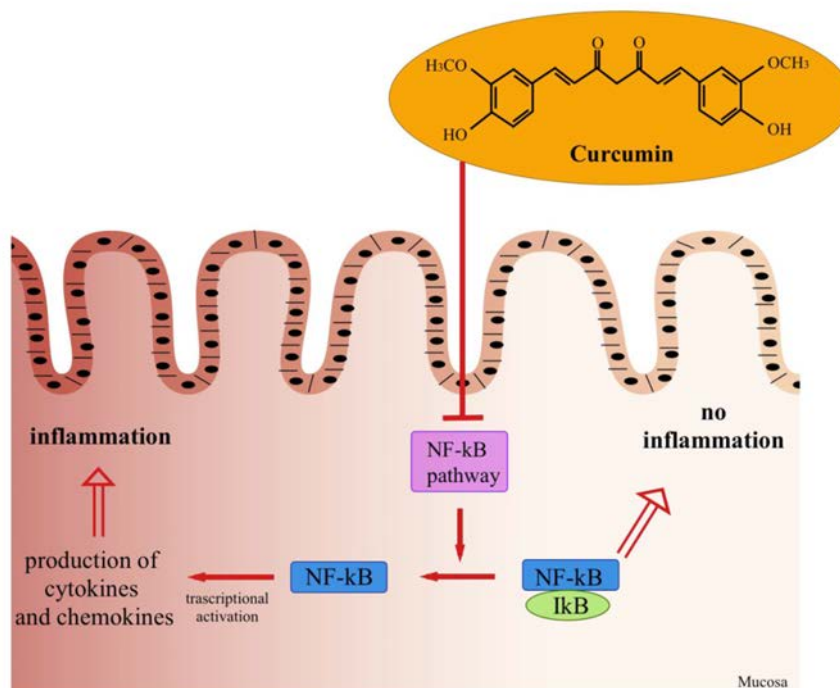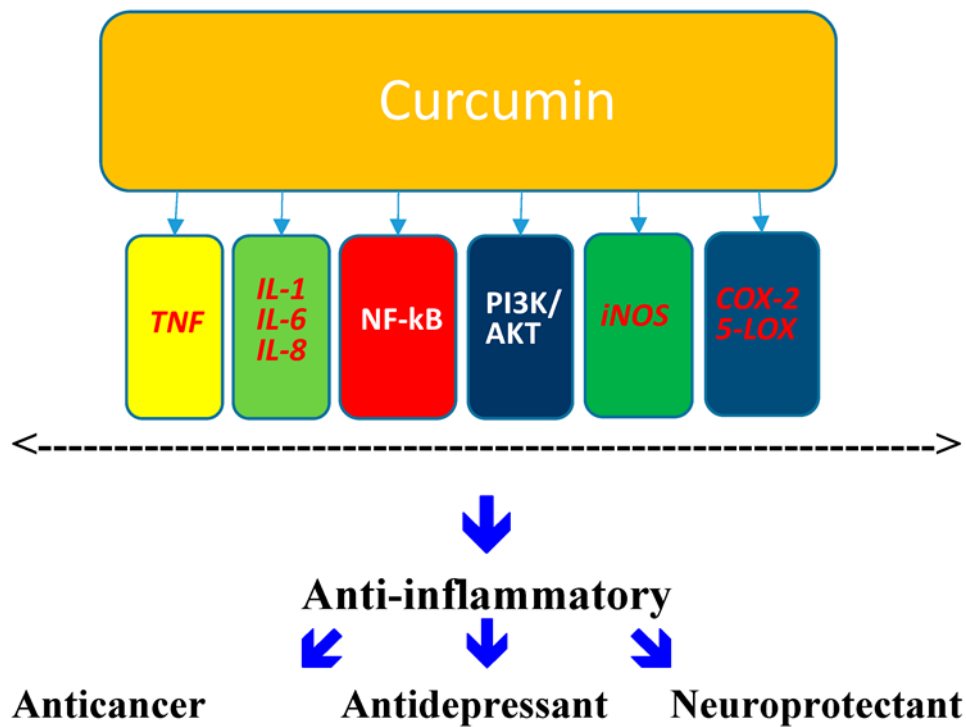
Metabolic syndrome is the condition in the start of abnormalities that can progress to chronic diseases especially Cardiovascular disease and Diabetes if we do not take care for prevention. In this group rather high hs-CRP and HbA1c that are the markers of chronic inflammation can be found. So that we used this group for the samples of this study.

He, Y., et al, 2015

Literature review

Turmaric is the usefulness plant for ancient medication in the world. It composes of many nutrients,many vitamins and minerals, espicially Curcuminoid mainly is Curcumin that can prevent oxidative stress and anti- inflammation through many pathway esp. NF-kB pathway. So it can prevent many chronic diseases. Many studies in both vitro and vivo for Curcumin show the positive results of Curcumin on anti-cancer, anti-depressant, neuroprotectant, anti-virus, antiamyloid, anti-artritis, anti-oxidative stress and anti-inflammation with less side effects.(He,Y.,et al.,2015)

Turmaric or Curcuma Longa Linn; is a local herb in Asian countries such as Thai, Chinese, India and others. It has the root under the ground, in Ginger family, dark yellow color and has a particular smell. It is used often for cooking, dye yellow color and ancient medication. For a long time that Turmaric used as a Herb for treatment of GI problem mainly and so now. There are many studies of Cucumin for antioxidative stress and anti-

inflammation to prevent and co-treatment of chronic diseases with less serious side effects.

However the disadvantage of Curcumin is the poor bioavailability because of the poor absorption from hydrophobic property, rapid metabolism and short biological half life from Glucuronidation and Sulfation for detoxification in liver. So current studies have solved this problem by many methods such as adding something to enhance bioavailability like Piperine or green tea or in the form of Curcumin extraction or nano-micelle technology for good absorption. And in oral form should take with meal that contained good oil.(Anand,P.,et al.,2007, Sehgal,A.,etal.,2011, Shoba,G.,et al.,1998)

Normally Turmaric contain 5-7 % of Curcumin; so pure oral Turmaric should more than 3.6 gm./day for clinically benefit. (Sharma,R.A.,et al.,2004) However, there is 13.34% Curcumin in Turmaric that is located in Amphoe Ban Ta Khun Surattani Thailand that used in this study. (examed by Center for Medical science 11 Suratthani ,February 2018)

There are some samples of the studies about Curcumin on inflammatory markers like;

1. Panahi Y.et al. : Study antioxidant and anti-inflammatory of Curcuminoid 1 gm.-Piperine 10 mg. combination per day on 59 samples metabolic syndrome compared with 58 samples metabolic syndrome on placebo for 8 weeks monitored level of SOD,MDA and CRP. The result show decreasing CRP and MDA and increasing SOD. (Panahi,Y.et al.,2015)

2.The study of Sahebkar A.: meta-analysis review from Pubmed/Medline and SCOPUS in 6 studies for decreasing CRP of bioavailability-inproved preparation Curcuminoids 172 samples compared with placebo 170 samples for more than 4 weeks.The result shows CRP decreased significantly in Curcuminoid group.(Sahebkar,A.,2014)

3. The study of de Meloa,ISV et al.: systemic review and meta-analysis of randomized controlled trials 11 studies,study on Curcumin, combined Curcuminoids or Turmaric extract for decreasing FBS and HbA1c. The results show the decreasing of FBS and HbA1c significantly.(de Meloa,ISV.et al.,2017)

4. The study of ZHANG Qing-bin et al.: study for Curcumin on hs-CRP and lipid in cardiovascular patients. Randomized controlled trial study in 64 cardiovascular patients devided into 2 groups, first group 34 samples on Curcumin capsule 100 mg. tid. after meal and second group 30 samples on Atovastatin 10 mg.OD., study for 6 weeks and monitoring before and after of TC,TG,LDL,HDL and hs-CRP. The result show that in both groups can decrease the level of hs-CRP and increase HDL. TG decreased more in Curcumin group but TC and LDL decreased more in Atovastatin group.(ZHANG Qing-bin. et al.,2007)

This study aimed to evaluate whether oral Turmaric powder can decrease the level of hs- CRP, HbA1c and do not increase SGPT level. To develope and emphasize Turmaric in a form that easy to prepare and lower cost, easy to consume and efficient to lower chronic inflammation and prevent chronic disease.

Methods

The study was approved by the Ethics committee, Facculty of Regenerative Medicine, Dhurakij Pundit University. No.002/61

This prospective clinical trial collected samples from population that come to the Hospital in Suratthani Province for health checking from February to May 2018 and agreed to participate in this study. Inclusion criterias were samples age more than 18 years old with Metabolic X syndrome , composed 3 out of 5 from modify NCEP ATP III 2001 criteria. Those are belly fat or BMI more than 25, blood TG equal or more than 150 mg%, blood HDL less than or equal 40 mg% in men and 50 mg% in women, blood pressure equal or more than 130/85 mmHg and FBS more than 100 mg%. Exclusion criterias were inclusion samples who pregnancy or breast feeding, SGPT more than 60 mg%, discontinuous consume Turmaric, allergy from Turmaric or Piperine, had any sickness that effect the level of hs- CRP, Hb A1c or SGPT, had any disease that cause coagulopathy or loss follow up. There are 46 samples were collected according to including criterias from population then briefly informed and consent. Blood test before the study were performed for indicators (hs CRP,HbA1c and SGPT) and the datas were saved in record form. The samples were received oral Turmaric for 2 capsules and 3 times per day with meals every day for 12 weeks. We used Turmaric planted in Amphoe Bantakhun Suratthani Thailand that contained high Curcumin (13.34%) mixed with Piperine (black peper) and produced by the Pharmacist from Thachang Hospital in Suratthani Province. One capsule contained 400 mg. Turmaric and 20 mg. Piperine. The samples were followed up monthly to see any side effects. When the study was completed for consumed Turmaric 12 weeks, 34 samples from 46 samples (12 samples were excluded) haved blood test for indicators again. The datas were collected and analized with Pair T-test statistic to compare the value before and after of inflammatory indicators then summary and report.

Finding

Table 1. show sex and number of inclusion samples

Sex	Number	Percent
male	4	8.7
female	42	91.3
total	46	100

Table 2. Shows the numbers and genders of the samples who lasted until the end of the study

Sex	Number	Percent
male	3	8.82
female	31	91.18
total	34	100

In metabolic syndrome, sample group found more in women than men

Table 3. Shows the factors of exclusion samples

Exclusions	Number	Percent
Side effect	5	41.7

Did not follow up	2	16.6
Sickness within 1-2 weeks before the final of the study	5	41.7
total	12	100

There are 5 samples (11% of total samples) leaved the study because of a lot of bloating that may be come from high fiber of Turmaric, and 5 samples fall in sickness that may be interfere for value of the indicators nearly the end of the study, so be excluded from the study.

There are 9 samples (20%) gained body weight about 1-3 kg. (but didn't leave the study), that may be from good digestion and eating a lot, solved by improving life style for eating and exercise.

Table 4. Shows the number of the samples into age groups

Age range (year)	Number	Percent
25 – 35	7	20.6
36 – 45	10	29.4
46 – 55	17	50
Total	34	100

Incidence of Metabolic-x syndrome increased fluctuate with advance age.

Table 5. Shows the mean of hs-CRP, HbA1c and SGPT before and after the study

Indicator	Mean (d)	Number of samples (n)	Std. Deviation	Std. Error Mean
hs-CRP before	3.6594	34	3.28856	.56398
hs-CRP after	2.7994	34	3.05985	.52476
HbA1cbefore	5.5794	34	.67679	.11607
HbA1c after	5.4941	34	.70321	.12060
SGPT before	23.5294	34	10.23729	1.75568
SGPT after	20.7941	34	9.38012	1.60868

The mean of hs-CRP, HbA1c and SGPT before and after the study shows in table 5. That decreasing of 3 markers

Table 6. Show the analyzed results of hypothesis

Indicator	Number of samples (n)	Mean (d)	Std. Deviation	t	p-value* (1-tailed)
hs-CRP before – after	34	.8600	1.72465	2.908	.003
HbA1c before– after	34	.08529	.18279	2.721	.005
SGPT before – after	34	2.73529	6.45407	2.471	.009

* p-value less than 0.05 = significant decrease

The result of hypothesis from analyzed with Pair T- test found that consuming oral Turmaric for 12 weeks can decrease inflammation indicator (hs-CRP), glycosylated hemoglobin (HbA1c) and liver enzyme (SGPT) significantly in statistic at P-value <0.05

Discussions

The prospective clinical trial study about consuming oral Turmaric 2400 mg.with piperine 120 mg per day (2 capsules 3 times a day) for 12 weeks in metabolic syndrome samples group on chronic inflammation indicator (hs-CRP), glycosylated hemoglobin (Hb A1c) and liver enzyme (SGPT) shows the results that decreasing of hs-CRP and Hb A1c on statistic significantly and do not increase SGPT significantly that we worried for liver damage from Turmaric that is Herb metabolized in liver. But in the opposite side, it can decrease SGPT significantly on statistic that showing may be positive result of turmeric for liver. This study show the result corresponding with previous studies of Panahi Y.et al., Sahebkar A.et al. and ZHANG Qing-bin et al. that studied for hs-CRP and the study of de Meloa,ISV.et al. for HbA1c that oral Curcumin or Turmeric can decrease those indicators.

The disadvantage of this study ; because of no placebo group , although the result is corresponding with the hypothesis that the decreasing of hs-CRP,HbA1c and SGPT significantly compared between before and after of the study. Nevertheless there are other factors that may be influence for those indicators like behavior about eating lifestyle or exercise. So it is credible if there is the placebo group in the design of the future study. And for the most usefulness in clinical, the next future study should be design in the patient that both having the diseases and high level of the indicators to compare before and after in consuming Turmaric or Curcumin.

The highlight of this study : Turmaric that used in this study contained high Curcumin and available in Suratthani Province in the southern of Thailand, accustomed for southern people using for cooking. So if we use for preventing chronic disease that is the big problem for population worldwide, it shoud be great. Another more; we used Piperine (black

pepper,the common herb) that is the great property to enhance bioavailability of Curcumin. Both Curcumin and Piperine in this proportion are easy to prepare for use. They are less side effects , common plant using at home.

Recommendations

1. It should be advantage if there are control group in the design of the further study.
2. For decreasing the side effects for using in long term of Curcumin from the area we used in this study (contained high Curcumin) and also the good result of anti-inflammation, the next design study may decreasing amount of Turmaric.

References

Aggarwal, BB. &Harikumar, KB.(2009). Potential effects of curcumin, the anti-inflammatory agent, against neurodegenerative, cardiovascular, pulmonary, metabolic, autoimmune and neoplastic diseases. *Int J Biochem Cell Biol,* 41, 40-59.

Aggarwal BB & Sung B. (2009). Pharmacological basis for the role of curcumin in chronic diseases: an age- old spice with modern targets. *Trends Pharmacol Sci.,* 30, 85-94.

Anand, P., Knnumakkara, A.B., Newman, R.A., Aggarwal B.B. (2007). Bioavailability of curcumin: Problems and Promises. *Mol. Pharm,* 4, 807-818.

De Meloa ISV, Dos Santosb AF, Buenoc NB. (2017). Curcumin or combined curcuminoids are effective in lowering the fasting blood glucose concentrations of individuals with dysglycemia: Systematic review and meta-analysis of randomized controlled trials. Pharmacol Res. Sep 16.

Gupta, SC., Patchva, S., Bharat, B., Aggarwal, BB. (2013). Therapeutic Roles of Curcumin: Lessons Learned from Clinical Trials. *AAPS Journal,* 15, 195-218.

Hatcher, H., Planalp R., Cho, J., Torti FM., Torti SV. (2008). Curcumin from ancient medicine to current clinical trails. *Cell Mol Life Sci.,* 65, 1631-1652.

Kanai, M., Imaizumi, A., Otsuka, Y., Sasaki, H., Hashiguchi, M., Tsujiko, K., Matsumoto, S., Ishiguro, H., Chiba, T. (2012). Dose-escalation and pharmacokinetic stydy of nanoparticle curcumin, a potential anticancer agent with improved bioavailability in healthy human volunteers. Cancer Chemother. *Phamarcol,* 69, 65-70.

Lao, C.D., Raffin, M.T., 4th; Normolle, D., Health, D.D., Murray, S.I., Bailey, J.M., Boggs, M.E., Crowell, J., Rock, C.L., Brenner, D.E. (2006). Dose escalation of curcuminoid formulation. BMC Complement. *Altern. Med.* 6, 10.

Moorti, C.&Kathiresan, K. (2013). Curcumin-Piperine/Curcumin-Quercetin/Curcumin-Silibinin dual drug-loaded nanoparticulate combination therapy: A novel approach to target and treat multidrug-resistant cancers. *J. Med. Hypotheses Ideas,* 7, 15-20.

Panahi, Y., Hosseini, MS., Khalili, N., Naimi, E., Majeed, M. & Sahebkar, A. (2015). Antioxidant and anti-inflammatory effects of curcuminoid-piperine combination in subjects with metabolic syndrome: A randomized controlled trial and an updated meta-analysis. *Clinnutr., Dec,* 34(6), 1101-8.

Ramin,, HR., Jaafari, MR., Mohummadpour, AH., Abnous K., GhayourMobarhan, M., Ramezanzadeh, E., Mousavi, F., Kazemi, Oskuee R., (2015) Curcumin:Reintroduced Therapeutic Agent from traditional Medicine to Alcoholic Liver Disease. *Asia Pacific J Med Tox,* 4, 25-30.

Rahimi, HR.&Kazemi, Oskuee, R. (2014). curcumin from Traditional Iranian Medicine to Molecular Medicine RazaviInt, *J Med.,* 2, 3-4.

Reuter, S., Gupta, S.C., Chaturvedi, M.M.&Aggarwal, B.B. (2010). Oxidative stress, inflammation and cancer, How are they linked ? Free Radic. *Biol.Med,* 49, 1603-1616.

Rosso J. (2017). Recommended Dosages for Turmeric. Livestrong.com Tracker. Oct 03.

Sahebkar A. (2014). Are curcuminoids effective C-reactive protein-lowering agents in clinical? Evidence from meta-analysis. *Phytother,* May, 28 (5), 633-42.

Sander, SK., Pandey, MK., Sung, B., Ahn, KS., Marukami, A., Sethi, G., Limtrakul, P., Badmaev, V., Aggarwal, BB., (2007). Curcumin, demethoxycurcumin, bisdemethoxycurcumin, tetrahydrocurcumin and turmerones differentially regulate anti-inflammatory and anti-proliferative responses through a ROS-independent mechanism. *Cacinogenesis,* 28, 1765-1773.

Schraufstatter, I., Hysiop, P.A., Jackson, J.H.&CochraneC.G. (1998). Oxidant-induced DNA damage of target cell. J. *Clin.Investig,* 82, 1040-1050.

Sehgal, A., Kumar, M., Jain, M., &Dhawan, D.K. (2011). Combined effects of curcumin and piperine in ameliorating benzo(a) pyrene induced DNA damage. Food Chem. *Toxical,* 49, 3002-3006.

Sharma, R.A., Euden, S.A., Platton, S.L., Cooke, D.N., Shafayat, A., Hewitt, H.R., Marczylo, T.H., Morgan, B., Hemingway, D., Plummer, S.M., et al. (2004). PhaseI clinical trial of oral curcumin: Biomarkersof systemic activity and compliance Clin. *Cancer Res.,* 10, 6847-6854.

Shoba, G., Joy, D., Joseph, T., Majeed, M., Rajendran, R., Srinivas, P. S. (1998). Influence of Piperine on the Pharmacokinetics of Curcumin in Animals and Human Volunteers. *Planta Med,* 64 (4), 353-356.

Singer, D., Nathan, DM., Anderson, KM., Wilson, PW. & Evans, JC. (1992). Association of HbA1c with Prevalent cardiovascular disease in original cohort of the Framingham Heart study. *Diabetes,* 41, 202-208.

Singh, S. (2007). From exotic spice to modern drug? *Cell,* 130, 765-8.

WHO.   Global status report on noncommunicable diseases, 2014.

ZengX, Cai D, Zeng Q, Chen Z, Zhong G, Zhou J, Gan H, Huang X, Zhao Z, Yao N, Huang D, Zhang D, Sun D, Chen Y. (2007). Selective reduction in the expression of UGTs Ts, a novel mechanism by which piperine enhances the bioavailability of curcumin in rat. *Biopharm Drug dispos. Jan,* 38(1), 3-19 .

ZHANG Qing-bin, LIU FU-yuan. (2007). Effect of curcumin on high-sensotivity C-reactive protein and blood-lipids in patients with coronary heart disease. *Chinese Traditional patent Medicine.*

Zhou, H., Beevers, C.S.&Huang, S., (2011) Targets of curcumin. *Curr Drug Targets. Mar1,* 12(3), 332-342.