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Comparative Study between the Effectiveness of Manual Therapy and Sham Manual Therapy on Pain Intensity at Rest and Mouth Opening in Temporomandibular Disorders (TMD) Patients

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Background: Temporomandibular Disorders (TMD) are a group of disorders affecting the masticatory muscles, temporomandibular joints (TMJ), and associated structures or both. Most common of the signs associated with TMD are pain and reduction in mouth opening, which can greatly interfere with daily activities. Physical therapy is an important management for TMD patients however; there is still a lack of strong supporting evidence.

Objectives: To determine the effectiveness of manual therapy and sham manual therapy on pain intensity at rest and mouth opening using randomized controlled trial.

Methods: Thirty one participants (9 males and 22 females with a mean age of 24.61 ± 4.58 years) were randomly assigned into manual therapy group (n = 16) or sham group (n = 15). Manual therapies consist of the myofascial release technique on masti-

catory muscles (10 minutes) and TMJ mobilization (5 minutes) whereas participants were received palpation without force in the sham group. The participants received a total for 15 minutes each treatment. Outcome measures included pain (Visual Analog Scale: VAS) and mouth opening and were assessed pre and post intervention. Data were analyzed by Repeated measure ANOVA.

Results: The results showed the significant difference in decreasing pain intensity between both groups ($P < 0.05$). However, in both groups were similar tend to reduce pain. Mouth opening was not significant

different between both groups at after treatment. In both groups was liable increase after treatment, in manual group higher than sham group.

Conclusion: These results indicate that both treatments in this study may be beneficial in improve the signs associated with TMD. Interestingly, manual therapy was higher effect than sham treatment. Can used as the alternative therapy for TMD.

Key words: Temporomandibular Disorders (TMD), manual therapy, mobilization, myofascial release, mouth opening

The Effect of Manual Therapy and Stretching Exercise on Using Pain Scale (VAS) in Dental Students with Neck Pain: a Single Blinded Randomized Control Trial

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Background: Neck pain is a major musculoskeletal disorder (MSDs) among dentists. It begins in their clinical practice as dental students.

Objective: To determine the effects of manual therapy and stretching exercises on by using the pain scale (VAS) in dental students with neck pain.

Method: Fourteen participants were in the control group and fourteen participants were in the treatment group. Both groups received manual therapy twice a week for 2 weeks. Additionally, the treatment group received active stretching daily exercises at home and a booklet with instructions on how to do the exercises. The regions of musculoskeletal problems will be defined according to the

questionnaire such as musculoskeletal pain symptoms in the neck region. The intensity of pain will be rated on a 10-point ordinal scale (VAS score): 0 = "no pain" and 10 = "the worst pain. Participants in both groups were followed up at pre-test, immediate effect, 48 hr followed up and 2 weeks later.

Result: The results show the VAS among participants was not significantly different between groups but was significantly different within groups ($p < 0.05$).

Conclusion: In the future, we should find out the specific treatment and exercise to improve neck pain in the dental students.

Key words: pain scale (VAS), neck pain, manual therapy, stretching exercises

The Agreement of Method for Testing Thoracolumbar Fascia Flexibility: the Wii-Board-TLF[®] Method, Tonometry, and Thoracolumbar Fascia Length Test

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Background: The thoracolumbar fascia (TLF) is the dense connective tissue that covers the dorsal trunk muscles. It is the main component for trunk stability and spinal movement. Poor flexibility of this fascia leads to back pain. Developing evaluation methods are needed for detecting this condition. Wii-Board-TLF[®] is a new method, which was modified based on the thoracolumbar fascia length test. The intra- and inter-examiner reliability showed a very high correlation; however, Wii-Board-TLF[®] and fashionable methods should be tested of agreement statistics.

Objective: The purpose of this study is to investigate the agreement statistics between Wii-Board-TLF[®] and goniometry, and Wii-Board-TLF[®] and thoracolumbar fascia length test for evaluating the thoracolumbar fascia tightness.

Methods: The methods of this study were approved by the Khon Kaen University Ethics Committee for Human Research (HE 532343). Fifty eight healthy participants (male and female) aged between 18-25 years old were recruited for this study the first session; a participant was evaluated

with Wii-Board-TLF[®] and goniometry at the same time. Each test was repeated 3 times and 1 minute per one session of testing (left 30 second and right 30 second). A participant was asked to rotate his/her trunk to the left and right side, respectively, and rest for 5 minutes. Degree of trunk rotation was compared the agreement statistics. In this session, data were modified from quantitative to qualitative data (using Kappa coefficient). The second session, a participant was evaluated with a novel method and the thoracolumbar fascia length test at the same time. A participant was asked to rotate his/her trunk to the left and right side, respectively, and rest for 5 minutes. Degree of trunk rotation and tightness feeling were compared the agreement statistics. Data were also modified from quantitative to qualitative data (using Kappa coefficient).

Results: The results showed a substantial agreement between Wii-Board-TLF[®] and goniometry ($K=0.62$, $p < 0.0001$) while Wii-Board-TLF[®] and thoracolumbar fascia length test showed a perfect agreement for trunk rotation measurement ($K=1.00$, $p < 0.0001$).

Conclusion: Wii-Board-TLF[®] showed a high level of similarities in result compared with goniometry and showed a very high intra- and inter-examiner reliability. Wii-Board-TLF[®] may be used for further study with the identification of spinal pain such as back pain with tightness of thoracolumbar fascia.

Key words: Thoracolumbar fascia, Wii-Board TLF[®], Goniometer

Evaluation of Phenolics Contents, Antioxidant and Acedylcholinesterase Inhibitory Activities of Abalone, Kaffir Lime Peel and Combined Extract of Both Substances

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Introduction and rationale: Memory enhancer is required not only for treating memory impairment but also for enhancing peak performance. Although both Abalone (*Helocotisasinine*) and Kaffir lime (*Citrus hystrix*) are reputed for memory enhancing effect, no scientific evidence concerning the antioxidant and acetylcholinesterase (AChEI) inhibitory effect is available. Based on the reputation of both substances, synergy concept and multi-target approach, we aimed to determine the antioxidant and AChEI effects of water extract of both

abalone and Kaffir lime and the combination extract of abalone and Kaffir lime.

Materials and method: Abalone and Kaffir lime were cleaned and dried in oven at $60\pm C$. They were cut into pieces, ground to powder and extract with maceration technique. The yielded solution was filtered and lyophilized as powder. The final extracts of both substances were determined total phenolics using Folin-Ciocalteu colorimetric method. Antioxidant activity was determined via DPPH assay whereas

acetylcholinesterase inhibitory (AChEI) effect was determined using Ellman method. Various concentrations of Abalone extract and Kaffir lime extract were also mixed at various ratios ranging from 1:1, 1:2, 1:3, 1:4, 1:5, 2:1, 3:1, 4:1 and 5:1. Then the combined extract was determined all mentioned parameters.

Results: The current results showed that the phenolics concentrations of Abalone and Kaffir lime peel extract were 35.75 ± 1.30 and 75.9 ± 0.50 mg GAE/g respectively. IC₅₀ of Abalone and Kaffir lime peel extract via DPPH assay were 3.72 mg/ml and 0.65 mg/ml respectively. This suggested that both substance were more potent than Ascorbic acid (IC₅₀ 0.33 mg/ml). IC₅₀ of acetylcholine esterase are 3.67 mg/ml and 4.03 mg/ml respectively (Aricept IC₅₀ is 0.07 mg/ml). In addition, it was found that Ratio of Abalone and Kaffir lime peel which showed highest potential to improve memory was 1:5.

Conclusion: The combined extract of Abalone and Kaffir lime peel may be the potential resource for developing cognitive enhancer. Researches in vivo, the determination of toxicity and possible active ingredients are worth for further study.

Acknowledgement: This study was supported by Integrated Complementary Alternative Medicine Research and Development Center, Khon Kaen University, Khon Kaen, Thailand.

Key words: Abalone, *Helicotisiasianina*, Kaffir lime, *Citrus hystrix*, antioxidant, acetylcholinesterase

Evaluation of Phenolics and Flavonoids Contents and Antioxidant Activity of Some Edible Plants in Northeast Thailand

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Introduction and objective: Recent findings have revealed that minimizing oxidative stress will promote our physical condition and prevent some degenerative diseases. Therefore, it is of great importance to find sources of safe and inexpensive antioxidants of natural origin in order to use them in foods and pharmaceutical preparations for preventing neuropsychological disorders. Based on the requirement of sources of safe and inexpensive antioxidant and neuroprotective effects of phenolics and flavonoids we aimed to determine the contents of total phenolics and flavonoids and antioxidant activity of some potential edible plants in Northeast Thailand.

Materials and methods: Water extract of mulberry (*Morus alba* L) root and flower of butterfly pea (*Cliteriaternatae* L) and fresh juices of papaya (*Carica papaya* L), orange (*Citrus reticulata* Blanco) and guava (*Psidium guajava* L.) were determined total phenolics and flavonoids using Folin-Ciocalteu and aluminium chloride colorimetric methods respectively whereas an antioxidant activity was determined via DPPH and FRAP assays.

Results: The results showed that mulberry root is the richest source of phenolics followed by butterfly pea, guava, orange and papaya. However, the richest source of flavonoids was butterfly pea followed

by mulberry root, guava, orange and papaya. Fresh guava juice exhibited the highest capacity to scavenge stable free radicals as shown by lowest IC50 in DPPH assay. The capability of antioxidant via DPPH assay was revealed as following guava juice>butterfly pea flower>orange juice>mulberry root>papaya juice. In FRAP assay, the highest ferric reducing capacity was observed in papaya juice. It was found that the ferric reducing capacity was as following: papaya juice>orange juice>mulberry root>guava>butterfly pea flower. Our results suggested that the antioxidant activity of selected edible plants did not show the tightly correlation with phenolics and flavonoids contents.

Conclusion: This study has demonstrated that besides phenolics other substances presented in the extract can exhibit antioxidant activity. Daily consumption of edible plants commonly found in Northeast Thailand can be sources of safe and inexpensive antioxidant and may be possibly served as neuroprotectant. However, further investigations in animal model, toxicity, possible active ingredients and clinical trial are very much essential.

Acknowledgement: This study was supported by Integrative Complementary Alternative Medicine Research and Development Center, Khon Kaen University, Khon Kaen, Thailand

Key words: *Morus alba*, Butterfly pea, papaya, guava, antioxidant

Screening of the Protective Potential Against Oxidative Stress Related Brain Damage of Different Parts of Mung Bean

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Introduction and rationale: Currently, the protective effect of herbal medicine against brain damage has gained much attention due to the increased prevalence, high socio-economic impacts of neuropsychological disorders and the limitation of treatment. Based on the limitation of therapeutic efficacy against oxidative stress related brain damage and their reputation in traditional folklore, we aimed to determine the phenolics contents and antioxidant activity of different parts of mung beans (*Vignaradiata* (Linnaeus)).

Materials and method: The leaves, pods, roots, stems and seeds of *V.radiata* were cut into small pieces and dried in a hot air

oven at 50 °C and ground to a fine power. The ground materials were macerated in 50% ethanol for 72 hours then the extracts were filtered. Antioxidant activity was carried out by using 2,2-diphenyl-1-picrylhydrazyl (DPPH) and ferric reducing antioxidant power (FRAP) assay and the levels of total phenolic compounds determined quantitatively using Folin-Ciocalteu assay.

Results: Total phenolic compounds were shown as following pods>leaves>roots >stems>seedsextracts (0.434 ± 0.0013, 0363 ± 0.003, 0.267 ± 0.004, 0188 ± 0.008 and 0.109 ± 0.005 mg Gallic acid equivalent (GAE)/ g, respectively). The

order of potency of antioxidant via DPPH was shown in the following sequence; leaves>roots> pods>stems>seeds. However, the potency of antioxidant via FRAP assay was shown as following; stems>seeds>leaves >pods>roots. No tight association between phenolics contents and antioxidant activity either via DPPH or FRAP assay.

Conclusion: Leaves of mung bean shows the highest potential to protect against oxidative stress related brain damage. However, further researches concerning toxicity,

the possible active ingredient and the study in animal model are required before moving to clinical trial.

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Key words: Mung bean, *Vignaradiate*, antioxidant.

Anxiolytic and Memory Enhancing Effects of PS2-56, A Combination Extract of *Bombyxmori* Pupae and *Morusalba* Leaves

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Introduction and objective: Anxiety and memory impairment are the most prevalent of psychiatric disorders. Due to the limitation of therapeutic efficacy and expensive cost, a novel regimen which is safe, cheap and easy to approach is required. Based on the concept of synergy of Oriental medicine and the beneficial effect of *Bombyxmori* pupae and *Morusalba* leaves on the central nervous system, we aimed to determine the anxiolytic and memory enhancing effects of the combination extract of *B.mori* and *M.alba* or PS2-56.

Materials and method: Male mice, weighing 25-35 g, were divided into the following groups; 1) Control 2) Vehicle 3) Positive con-

trol 4) PS2-56 30 mg/kg 5) PS2-56 60 mg/kg 6) PS2-56 90 mg/kg. The mice in group 3 were subdivided into group which was treated with diazepam during anxiety assessment and group which was treated with Aricept during memory assessment. All animals except those in control group were orally given the assigned substance at a period of 28 days. Memory enhancing effect was performed using Morris water maze test whereas anxiety was assessed using Morris water maze test. In addition, locomotor behavior was also evaluated. All assessments were performed every 7 days throughout the study period. All data were analyzed using ANOVA followed by LSD test.

Results: The current results showed that mice which subjected to all doses of PS2-56 significantly decreased escape latency time but increased retention time in Morris water maze test. The increased time spent in the open arm was also increased while no significant change in locomotor activity was observed. These results suggested that PS2-56 at all doses used in this study possessed anxiolytic and memory enhancing effects.

Conclusion: PS2-56 is the potential candidate anxiolytic and memory enhancing regimen. Therefore, it can be served for the development of cheap and effective functional food and PS2-56 based medicine to improve these psychological disorders. However, further researches concerning possible active ingredient, underlying mechanism and toxicity are essential before moving forward to clinical trial.

Acknowledgement: This study was supported by Integrative Complementary Alternative Medicine Research and Development Center, Khon Kaen University, Khon Kaen, Thailand

Key words: *Bombyxmori*, *Morusalba*, anxiety, memory

Evaluation of Antioxidant and Anti-diabetic Effects of Mulberry Root and Different Parts of Pineapple, the Economic Plant in Northeast Thailand

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Introduction and rationale: To date, cheap, safe and effective therapeutic strategies against oxidative stress related brain damaged and diabetic together with its complications are required due to the increased prevalence of the conditions mentioned earlier and their great impacts on annual health budget. Although mulberry (*Morus alba* L) and pineapple (*Ananas comosus* L Merr), the economic plants in Northeast Thailand, are reputed for both antioxidant and anti-diabetic, less supported evidence concerning mulberry root and various parts of pineapple was available. Therefore, we aimed to determine total phenolic contents, antioxidant and anti-diabetic effects of mulberry root

and different parts of pineapple including peel, pulp and core.

Materials and methods: Roots of mulberry cultivars in Thailand (Buriram 60 and Sakon-Nakhon) were prepared as water extract by decoction method whereas peel, pulp and core of pineapple (cultivar smooth Cayene) were prepared as water and 50% hydroethanolic extract by maceration technique. All yielded extracts were dried and kept at $-20 \pm C$. All extracts were determined phenolics and flavonoids contents using Folin-Ciocalteu and Aluminum chloride methods. Antioxidant evaluation was determined via DPPH assay whereas anti-diabetic effect

was determined via the suppression effect of alpha-amylase and alpha-glucosidase by colorimetric method in microplate reader.

Results: Our results showed the order of phenolics concentrations as following aqueous extract of pineapple peel (PDW)>Root of mulberry (Buriram 60)>Root of mulberry (Sakon Nakhon ; MSK)=ethanolic extract of pineapple peel (PET)>water extract of fruit pulp of pineapple (FDW)=ethanolic extract of fruit pulp of pineapple (FET)>aqueous extract of core of pineapple (CDW)=ethanolic extract of core of pineapple (CET). Flavonoids contents were demonstrated as the following sequence; PDW>PET>FDW>MBR>MSK>FET>CDW>CET. However, the magnitude of antioxidant was shown in the different order from those of phenolics and flavonoids. It was found that the antioxidant activity was found as the following sequence; MBR>MSK>PDW>PET>FDW>FET>CDW>CET. Antidiabetic activity via the suppression activity of α -amylase was shown as the following sequence; MBR>PET>FET=CET>FDW=MSK>CDW=PDW. However, the order of α -glucosidase suppression effect was shown as following; PDW>PET=MBR>FET=CDW>CET=

MSK>FDW. Taken all data together, these data suggest that besides phenolics and flavonoids, other substances may play roles on antioxidant and antidiabetic activities.

Conclusion: Our data point out that both root of mulberry especially Buriram60 cultivar and peel of pineapple show the potential to be served as resources for antioxidant and antidiabetic agents. It is worth for further study toxicity, possible active ingredient and the protective effect of both substance against oxidative stress related brain damaged and diabetic together with its complications in vivo. Therefore, root of mulberry and peel of pineapple can be increased their values as functional food.

Acknowledgement: This study was supported by Integrated Complementary Alternative Medicine Research and Development Center, Khon Kaen University, Khon Kaen, Thailand.

Key words: Mulberry, *Morus alba*, Pineapple, *Ananas comosus*, antioxidant, antidiabetic

Effect of the Polyherbal Food Supplement, WO, on the Central Nervous System

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Introduction and rationale: At present, novel agent which is safe, cheap and effective for the treatment of mood disorders and memory in menopause is required due to the limitation of current therapeutic efficacy. Dietary therapy has been long term used both for tonic activity and for treating numerous ailments. Based on the cheap cost, less side effects and the reputation concerning the antioxidant and neuroprotective effects of *Morus alba* L, *Oryza sativa* L. *indica* (purple color), *Zingiberofficinale* Roscoe and chicken broth, we aimed to determine the effect of WO, the polyherbal recipe comprising of *Morus alba*, *Oryza sativa* (purple color), *Zingiberofficinale* and

chicken broth, on the central nervous system of ovariectomized rats.

Materials and method: Female Wistar rats were divided into the following groups; 1) Sham operation group which received no treatment, (2) Vehicle group which received distilled water, (3-4) Positive control groups which received Isoflavone (15 mg/kg BW) and Vitamin C (250 mg/kg BW) respectively (5-7) WO treated groups which received WO at dose of 1, 2, 3 ml/kg BW respectively. 7 days after surgery, all rats except those in sham operation group were treated with the assigned substances for 35 days. They were assessed anxiety, depression and

memory using elevated plus maze, forced swimming test and Morris water maze test every 7 days throughout the study period. Locomotor was also determined to assure the false positive.

Results: WO at all doses used in this study significantly decreased escape latency throughout the study period. The increased retention time in Morris water maze test was observed only in rats subjected to medium and high doses of WO. The significant changes was observed since 21-day of treatment until the end of study period. No significant changes in time spent in the open arm and immobility time in elevated plus maze and forced swimming test were observed. These data suggested that WO could enhance memory in OVX rats.

Conclusion: Polyherbal recipe or WO is the potential cognitive enhancer in animal model of menopause. Therefore, it is worth for further study about possible active ingredient, toxicity and underlying mechanism.

Acknowledgement: This study was supported by Integrative Complementary Alternative Medicine Research and Development Center and Targeted Research, Faculty of Medicine, Khon Kaen University, Khon kaen, Thailand.

Key words: Polyherbal, *Morusalba*, *Zingiberofficinale*, *Oryza sativa*, central nervous system.

In Vitro and In Vivo Evaluation of Oxidative Stress Status and GABA-T Inhibitory Effects of Clitoria Ternatea Flowers in Hippocampus and Cerebral Cortex of Epileptic Mice Induced by Pentylentetrazole

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Introduction and objective: Due to the crucial role of oxidative stress and GABAergic system on the pathophysiology of epilepsy and the beneficial effects of the extract to improve seizure and memory impairment, we aimed to determine both *in vitro* and *in vivo* effect of *C. ternatea* on oxidative stress status and GABAergic function in cerebral cortex and hippocampus of epileptic.

Materials and methods: The extract of *C. ternatea* flowers was prepared via decoction method. The yielded extract was lyophilized as powder. The final extract contained total

phenolic compound at concentration of 71.916 ± 1.816 mg/LGAE/mg extract. Then, it was determined antioxidant using DPPH and FRAP assays. To investigate the *in vivo* effect of this plant extract, male ICR mice were grouped into various groups as following; 1) control 2) vehicle 3) *C. ternatea* extract 200 mg/kg 4) *C. ternatea* extract 400 mg/kg 5) *C. ternatea* extract 800 mg/kgBW. The animals were orally given the assigned substances for 14 days. Then, they were injected PTZ at dose of 75 mg/kgBW via intraperitoneal route. 24 hours later, all animals were sacrificed, cerebral cortex and hippocampus were collected to determine

lipid peroxidation product (MDA) level and GABA-T activity.

Results: The antioxidant activities of *C. ternatea* flowers extract via DPPH and FRAP assays were $174.83 \pm 1.790 \mu\text{g/ml}$ and $311.333 + 16.971 \mu\text{M}$ L-ascorbic acid equivalence/mg extract, respectively while the IC_{50} of GABA-T inhibition was $229.692 \pm 2.457 \mu\text{g/ml}$. In addition, it was found that all dose of *C. ternatea* flowers extract showed the significant decreased MDA level in hippocampus while *C. ternatea* flowers extract at doses of 400 and 800 mg/kgBW showed the significant decreased of MDA level only in cerebral cortex. In addition, the suppression effect of the extract on GABA-T in cerebral cortex was also observed in cerebral cortex of epileptic mice while the suppression effect on GABA-T in hippocampus was observed only in epileptic mice subjected to 200 mg/kgBW.

Conclusion: Both in vitro and in vivo data showed the antioxidant and GABA-I effects of *C. ternatea* flowers. These data suggest that the extract might protect against brain damage and over excitation in epilepsy. Thus, it is worth for development as health product to protect against epilepsy. However, the toxicity, behavior together with biochemical and electrophysiology studies are required before moving to clinical trial.

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Key words: *Clitoria ternatea*, oxidative stress, GABA, pentylenetetrazole, epilepsy

Screening of the Cerebroprotective Effect Selected Vegetables

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Introduction and objective: Nowadays, the beneficial effect of plant-based recipe has gained much attention. Due to the increased prevalence and therapeutic efficacy limitation of neurological disorders, we hypothesized that the selected vegetables could exhibit the cerebroprotective effect. Therefore, this study aimed to determine the phenolics and flavonoids contents and antioxidant activity of the selected vegetables.

Materials and method: 7 edible plants were collected from Khon Kaen province, Thailand. Leaves of *Morus alba* L., bulbs of *Allium ascalonicum* L. (Shallot and Red onion), bulbs of *Solanum melongena* L. (3 varieties; purple color, long green, and

green striped), and the aerial part of *Apium graveolens* L. were cleaned, dried plants and extracted with distilled water (1 : 10) for 6 days in dark room, shaking every 24 hours. All solutions were filtrated every 3 days and let dried. The yielded extracts were determined contents of total phenolic compounds and total flavonoids via Folin-Ciocalteu and Aluminum Chloride methods respectively while antioxidant effect was determined via DPPH and FRAP assays.

Results: The highest concentration of total phenolics was observed in *S. melongena* var. purple color (154 mg GAE/g extract). The order of total phenolics was shown as following; *S. melongena* var. purple color > *S. melongena* var. long green > *S. melongena*

var.green striped>*A.ascalonicum*(shallot)
> *A.graveolens*>*M.alba*>*A.ascalonicum*(red
onion). Flavonoids concentrations were
observed as the following sequence;
A.graveolens.>*A.ascalonicum*(red onion)>*S.*
melongeva var. purple color>*S. melongena*
var long green>*A.ascalonicum*(shallot)>*M.*
alba>*S.melongena* var. green striped. Ability
to scavenge stable free radicals was
shown as following; *S.melongena* var. green
striped>*M.alba*>*A.ascalonicum*(Shallot)>*S.*
melongena var long green>*S.melon-*
geva var. purple color>*A.ascalonicum*
(red onion)>*A.graveolens*. In addition, it
was found that Ferric reducing power
was revealed as shown in the follow-
ing sequence; *S.melongeva* var. purple
color>*S. melongena* var long green>*S.*
melongevavar. green striped>*M.alba*>*A.*
ascalonicum (red onion)>*A.graveolens*>*A.*
ascalonicum(Shallot). These data demon-
strated the antioxidant potency of the se-
lected plants wither via DPPH or via FRAP
failed to show the tight association with the
concentrations of flavonoids and phenolics.

Conclusion : 7 plant extract showed the
antioxidant activity. However, *Solanum*
melongena L.in all var.show the high-
est antioxidant potential compared with
other tested plants. Thus, this plant may
be served as the resource for health product
development. However, further researches
concerning other biological activities re-
lated to brain functions, possible active
ingredients, toxicity and in vivo test in
animal models of neurological diseases are
still required.

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velopment Center, Khon Kaen University,
Khon Kaen.

Key words : *Solanummelongena*, *Morus*
alba, *Apium graveolens*, *Allium ascaloni-*
cum, antioxidant

In Vitro Screening the Neuroprotective Effect of Pineapple (*Ananascomosus*) Against Cerebral Ischemia

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Objective : Stroke especially the ischemic stroke has been recognized as one of the important health problems worldwide. The pathophysiology of ischemic stroke is complicated and involves the oxidative damage. Therefore, the present study aimed to determine the antioxidant activity and the inhibitory effects of pineapple (*Ananascomosus*) on acetylcholinesterase (AChE) and monoamine oxidase enzymes type A and type B (MAO-A and MAO-B).

Materials and method: The pineapple (*Ananascomosus* L.) fruits were collected from Amphur Sriracha, Chonburi province, Thailand. They were cleaned and separated

them into several parts including stalk, shell, pulp and shoot apex. Then, there were dried with the oven at 60 °C and milled into small pieces using an electrical blender. For the aqueous extract 3 grams of each part of pineapple was submerged in 30 ml distilled water for 3 days. The aqueous extract of each part of pineapple was filtrated and dried. Finally, the extracts were determined the antioxidant activities by 1,1-diphenyl-2-picrylhydrazyl radical scavenging (DPPH) and ferric reducing antioxidant power (FRAP) assays and also determined the suppression activities of AChE, MAO-A and MAO-B.

Results : Antioxidant activity of the aqueous extract of pineapple shoot apex and pulp determined by DPPH and FRAP exhibited considerable antioxidant potential higher than other parts. Moreover, The AChEI, MAO-AI and MAO-BI activities were also investigated. The result demonstrated that the aqueous extract of pineapple stalk shows the most active suppression activity of the AChE, and the pineapple pulp shows the most active suppression activity of all MAO-A and MAO-B. In addition, The result determined the total phenolic compounds using Folin-Ciocalteu assay showed that the most total phenolic content found in the pineapple shoot apex at 161 mg gallic acid equivalence/g extract.

Conclusion : Strong inhibitory activities of the shoot apex, the stalk and the pulp against key enzymes, AChE and MAO both type A and type B, linked to learning and memory in vitro, coupled with their antioxidant properties, suggest that pineapple could be used in the prevention and management of any pathological conditions related with oxidative stress including ischemic stroke. The shoot apex, the stalk and the pulp are the most promising parts of pineapple to develop into the potential food supplement. However, further research concerning the efficiency in animal model of ischemic stroke and its mechanism are still essential.

Key words : *Ananas comosus*, antioxidant, Acetylcholinesterase, Monoamine oxidase, ischemic stroke

Evaluation of Phenolics and Flavonoids Contents and Antioxidant Activity of Some Edible Plants in Northeast Thailand

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Introduction and objective: Recent findings have revealed that minimizing oxidative stress will promote our physical condition and prevent some degenerative diseases. Therefore, it is of great importance to find sources of safe and inexpensive antioxidants of natural origin in order to use them in foods and pharmaceutical preparations for preventing neuropsychological disorders. Based on the requirement of sources of safe and inexpensive antioxidant and neuroprotective effects of phenolics and flavonoids we aimed to determine the contents of total phenolics and flavonoids and

antioxidant activity of some potential edible plants in Northeast Thailand.

Materials and methods: Water extract of mulberry (*Morus alba* L) root and flower of butterfly pea (*Cliteriaternatae* L) and fresh juices of papaya (*Caricapapaya* L), orange (*Citrus reticulata* Blanco) and guava (*Psidiumguajava* L.) were determined total phenolics and flavonoids using Folin-Ciocalteu and aluminium chloride colorimetric methods respectively whereas an antioxidant activity was determined via DPPH and FRAP assays.

Results: The results showed that mulberry root is the richest source of phenolics followed by butterfly pea, guava, orange and papaya. However, the richest source of flavonoids was butterfly pea followed by mulberry root, guava, orange and papaya. Fresh guava juice exhibited the highest capacity to scavenge stable free radicals as shown by lowest IC₅₀ in DPPH assay. The capability of antioxidant via DPPH assay was revealed as following guava juice>butterfly pea flower>orange juice>mulberry root>papaya juice. In FRAP assay, the highest ferric reducing capacity was observed in papaya juice. It was found that the ferric reducing capacity was as following: papaya juice>orange juice>mulberry root>guava>butterfly pea flower. Our results suggested that the antioxidant activity of selected edible plants did not show the tightly correlation with phenolics and flavonoids contents.

Conclusion: This study has demonstrated that besides phenolics other substances presented in the extract can exhibit antioxidant activity. Daily consumption of edible plants commonly found in Northeast Thailand can be sources of safe and inexpensive antioxidant and may be possibly served as neuroprotectant. However, further investigations in animal model, toxicity, possible active ingredients and clinical trial are very much essential.

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Key words: *Morusalba*, Butterfly pea, papaya, guava, antioxidant

อัตราการเปลี่ยนกลับยาgabapentin ในโรงพยาบาลศรีนครินทร์ ขอนแก่น

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บทนำ: ในรพ.ศรีนครินทร์มีgabapentin 2 ฟอรั่ม คือgabapentin ชื่อสามัญ และ ยาgabapentin ต้นแบบ ซึ่งราคาขายต้นแบบแพงกว่ายาชื่อสามัญ ประมาณ 8 เท่า ดังนั้นเดือนสิงหาคม 2554 รพ.ศรีนครินทร์จึงมีนโยบายให้แพทย์สั่งจ่ายยาชื่อสามัญเป็นยาตัวแรก เมื่อมีความจำเป็นต้องใช้ยาต้นแบบ จึงสามารถเปลี่ยนได้โดยคำนึงถึงผลการรักษาเป็นหลัก โดยระบุเหตุผลที่ต้องเปลี่ยนยา

วัตถุประสงค์การวิจัย: เพื่อศึกษาอัตราการเปลี่ยนกลับยาgabapentin ชื่อสามัญ เป็นยาgabapentin ต้นแบบ รวมทั้งต้องการทราบถึงโรคและสาเหตุของการเปลี่ยนกลับยาและมูลค่าการลดค่าใช้จ่ายจากการเปลี่ยนไปใช้gabapentin ชื่อสามัญเป็นยาตัวแรก

วิธีการศึกษา: เป็นการศึกษาแบบย้อนหลัง เก็บข้อมูลจากเวชระเบียนผู้ป่วยที่ใช้gabapentin ทั้งหมดที่รักษาในโรงพยาบาลศรีนครินทร์ ตั้งแต่วันที่ 1 สิงหาคม พ.ศ. 2554 ถึงวันที่ 1 มีนาคม พ.ศ. 2556

ผลการศึกษา: พบว่ามีผู้ป่วยใช้gabapentin ชื่อสามัญ ทั้งสิ้น 5,195 คน และเมื่อมีการนัดติดตามการรักษาแล้วแพทย์ผู้รักษาจะพิจารณาว่ามีความจำเป็นต้องจ่ายgabapentin ต้นแบบหรือไม่ และสามารถเปลี่ยนไปจ่ายgabapentin ต้นแบบได้ โดยคำนึงถึงผลการรักษาเป็นหลัก พบว่ามีผู้ป่วยที่มีการเปลี่ยนกลับยาจากgabapentin ชื่อสามัญ เป็นยาต้นแบบ 310 คน (ร้อยละ 6.0) ช่วงความเชื่อมั่นที่ร้อยละ 95 อยู่ระหว่าง ร้อยละ 5.3 - 6.6 ในจำนวนนี้พบว่า

เป็นผู้ป่วยเพศชาย 97 คน (ร้อยละ 31.3) และเพศหญิง 213 คน (ร้อยละ 68.7) อายุโดยเฉลี่ย (ค่า median age) 61 ปี (15-89 ปี) โดยสิทธิการรักษาของผู้ป่วยที่มีการเปลี่ยนกลับยาส่วนใหญ่เป็นสิทธิข้าราชการ 256 คน (ร้อยละ 82.6) รองลงมาเป็นสิทธิประกันสุขภาพถ้วนหน้า 28 คน (ร้อยละ 9) โดยผู้ป่วยที่มีการเปลี่ยนกลับยาส่วนใหญ่ได้รับยาากาบาเพนตินด้วยข้อบ่งชี้คืออาการเจ็บปวดทางระบบประสาท (neuropathic pain) 266 คน (ร้อยละ 85.8) โดยพบว่าอาการดังกล่าวเกิดจากโรคกระดูกสันหลังเสื่อมและกดทับเส้นประสาท (spondylosis) มากที่สุด 229 คน (73.8%) ผู้ป่วยใช้ยาากาบาเพนตินชื่อสามัญโดยเฉลี่ยนานประมาณ 3 เดือน ก่อนที่จะได้รับการเปลี่ยนเป็นยาต้นแบบ โดยพบว่าแพทย์ไม่ได้ระบุเหตุผลในการเปลี่ยนกลับยามากถึง 288 คน (ร้อยละ 93) รองลงมาระบุเหตุผลว่าการรักษาไม่ได้ผล 22 คน (ร้อยละ 7) ซึ่งส่วนใหญ่ได้รับในขนาดที่ยังไม่สูง คือ 600-900 mg/d

ในแง่ของค่าใช้จ่ายในการสั่งซื้อยาากาบาเพนติน ในรพ.ศรีนครินทร์ เมื่อสำรวจคำสั่งซื้อยาก่อนที่จะมีนโยบายให้ใช้ยาชื่อสามัญพบว่ามีมูลค่าถึง 501,952.03 บาท/เดือน (กรกฎาคม 2554) ภายหลังจากใช้นโยบายแล้วและมีการ switchback จากชื่อสามัญ เป็นยาต้นแบบ ร้อยละ 6 พบว่ามีคำสั่งซื้อยา 293,619.97 บาท/เดือน (เมษายน 2556) ซึ่งประหยัดค่าใช้จ่ายได้ถึง 208,332.06 บาท/เดือน หรือ 2,499,984 บาท/ปี ซึ่งผลการศึกษานี้สามารถนำไปใช้ประกอบการออกนโยบายการสั่งซื้อ/จ่ายยาากาบาเพนติน ชื่อสามัญ ยาต้นแบบ อย่างสมเหตุผลในรพ.ศรีนครินทร์ได้

สรุป: อัตราการเปลี่ยนกลับยาากาบาเพนตินจากยาชื่อสามัญ เป็นยาต้นแบบในรพ.ศรีนครินทร์คือ ร้อยละ 6 โดยพบว่ามีกระบวนการระบุเหตุผลของการเปลี่ยนกลับยาเพียง ร้อยละ 7

Status Epilepticus in Thailand

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Background: Status epilepticus (SE) is a major neurological emergency that is associated with a significant mortality. The national database of SE in Thailand and other developing countries is limited in terms of incidence and treatment outcomes.

Methods : We retrospectively explored national data in Thailand for reimbursement of all adult patients (over 18 years old) admitted SE patient in the fiscal year 2004-2012. SE patients were diagnosed and searched based on ICD 10 (G41) from the national database.

Results: We found 12,367 SE patients. The average age was 48.14 years (18-104 years) and 8,119 patients were males (65.7%). Discharge status of most SE patients was improved (9,231 cases, 74.6%), while 2,033

patients (16.4%) did not improved and 1,045 patients (8.4%) died. Only 58 patients (0.5%) showed complete recovery. The most common comorbid diseases were hypertension (1,790 patients, 14.5%); DM (1,064 patients, 8.6%) and stroke 1,790 patients, 14.5%). Pneumonia was the most common complication in 1,201 patients (9.7%).

Conclusion: Based on our data, at least 12,367 patients would be affected by SE in Thailand, associated with 1,045 deaths. Furthermore, this study confirms the higher incidence of SE in male patients.

Factors Associated with Poor Outcomes in Status Epilepticus Patients at Khon Kaen Hospital

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Background: Status epilepticus is a serious neurological condition with high mortality. A national data from Thailand showed that factors that associated with death are type of insurance and hospital level. There is limited data on these factors at Khon Kaen Hospital or other tertiary care hospital.

Objective: To study factors associated with poor outcomes in status epilepticus patients at Khon Kaen Hospital.

Methods: All consecutive patients diagnosed as status epilepticus at Khon Kaen Hospital were enrolled. The study period was October 1st, 2002 to September 30th, 2012. All medical charts of eligible patients

were reviewed. Patients were divided into two groups by discharge type; improved vs not improved. The not improved discharge status included death, not improved, and against advice. Clinical features were compared between both groups.

Results: There were 211 patients diagnosed as status epilepticus during the study period. Of those, 91 patients (43.13%) were in not improved group. Significant factors between those who were improved and not improved were location of seizure occurrence, Glasgow coma scale (GCS), plasma glucose, serum creatinine, serum sodium, and serum albumin. Those patients who were not improved had seizure attack at

hospital (30.77% vs 3.33%), lower GCS (7.97 vs 9.78), higher plasma glucose (203 vs 159 mg/dL), higher serum creatinine (2.01 vs 1.18 mg/dL), higher serum sodium (138.03 vs 135.49 mg/dL), and lower serum albumin (2.73 vs 3.52 g/dL) than those who were improved at discharge.

Conclusion: There were six significant prognostic factors in status epilepticus patients who were treated at Khon Kaen Hospital.

Key words: status epilepticus; outcomes; prognosis; tertiary care hospital; Thailand

Effects of Distraction and Focus of Attention on Postural Stability in High-heeled Shoes Woman: a Pilot Study

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Objective: Our previous study showed there was a trend to have a shorter sway path in the external focus of attention. However, no study investigated the distraction and focus of attention in the same experiment to confirm the role of cognitive for regulating postural control. The purpose of this pilot study was to examine how distraction and focus of attention would differentially affect postural stability in high-heeled shoes woman.

Method: Ten healthy young adults who are not wearing high-heeled shoes regularly, with no balance and cognitive impairment, participated in this study. All participants stood on 7-cm high-heeled shoes in semi

tandem standing and performed three 30-s trials under each of the three conditions including: 1). baseline condition where standing still instruction, 2). distraction condition where instruction to calculate serial 7 subtraction, and 3). focus of attention condition where instruction to focus on reducing movement of the shoes (external focus of attention). The outcome was the sway path which was calculated by using Wii Balance Board. One way ANOVA was employed for the statistical analysis, with the level of significance set at 5%.

Result: There was a trend to have a shorter sway path in focus of attention condition (870.86 ± 142.18 mm.) and longer sway path

in distraction condition (1016.07 ± 142.17 mm.) when compared with baseline condition (981.04 ± 163.22 mm.) However, there was no statistically significant differences among the conditions ($p=0.1335$).

Conclusion: It is concluded that based on our pilot data, we could not find any different in sway paths among the 3 conditions. Further study with larger sample size is needed.

Subcellularly Localized NaV mRNAs in Boyden Chamber Sensory Neuron Cultures

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Protein and mRNA subcellular localizations have been extensively examined in neurons and shown to play pivotal roles for the function of distant axons. Our study showed that increased mRNA accumulation of a voltage-gated sodium channel NaV1.8 in the injured sciatic nerve experiencing painful neuropathy (Ruangsri et al, 2011). Here we present a modified Boyden chamber-based culture of rat dorsal root ganglia (DRG) neurons for the mechanism of painful neuropathy. Methods: L4-L5 DRGs harvested from adult naïve or sciatic nerve entrapment (SNE) rats were cultured for 48 hrs on the Boyden chamber culture system involving a porous membrane (8 μm pores, BD Falcon, Bedford, MA). The DRG or cell

body remained in the upper compartment whereas the axons were protruded to the lower compartment. Thus, cell bodies and axons were separately isolated from the upper or lower side of the porous membrane. The harvested cell body or axons were subjected to total RNA preparation. Real-time PCR was performed to measure NaV1.3, NaV1.5, NaV1.6, NaV1.7, NaV1.8, NaV1.9 and cytoskeleton β -actin. GAPDH was used as the endogenous control. Results: Cell body and axon components in this model gave rise to a measurable amount and good quality of total RNA. Real-time PCR resulted in the identification of mRNA of a cytoskeletal molecule β -actin, which has been reported to accumulate in regen-

erating axons (Michaevlevski et al., 2010). NaV1.8 mRNA showed four-fold increase in the axons ipsilateral to SNE whereas NaV1.9 mRNA and NaV1.6 showed three-fold and 2.5 fold increase in the injured side, respectively. Conclusion: These results suggest that NaV1.8 mRNA together with NaV1.9 and NaV1.6 mRNAs may be differentially transported to the injured axons. This *in vitro* model sustained the disease phenotype of peripheral nerve injury and can serve as a method to investigate the mechanism of painful neuropathy involving mRNA axonal transfer.