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HONEY - THE EMERGENCE OF POSITIVE SCIENTIFIC EVIDENCE FOR HEALTH AND DISEASE

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HONEY

A natural sweet substance produced by honey bees from the nectar of blossoms & honeydew (the secretions of living parts of plants or excretions of plant-sucking insects on the living parts of plants-aphides) the collected nectar and honeydew are transformed by combining with specific substances from bees (bee to other bee - tropholaxy), deposited, dehydrated, stored and leaved in the honey comb to ripen and mature.

Codex Alimentarius Commission:Codex standard for honey (2001)
http://www.codexalimentarius.net/standard_list.

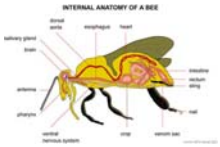
WHAT IS HONEY?

- a sweet, viscid fluid produced by bees from the nectar or honeydew and stored in nests or hives as food

Source of local honey in Malaysia

Stinging bees

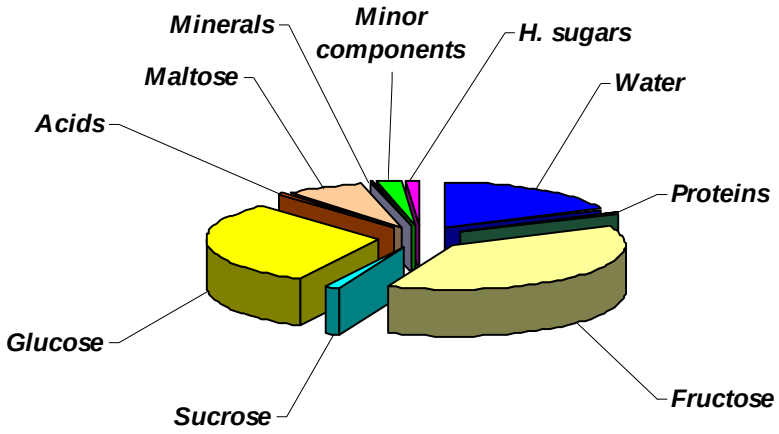
- *Apis dorsata* (lebah hutan, tualang, gelam)
- *Apis mellifera* (lebah Eropah)
- *Apis cerana* (lebah timur, keran)



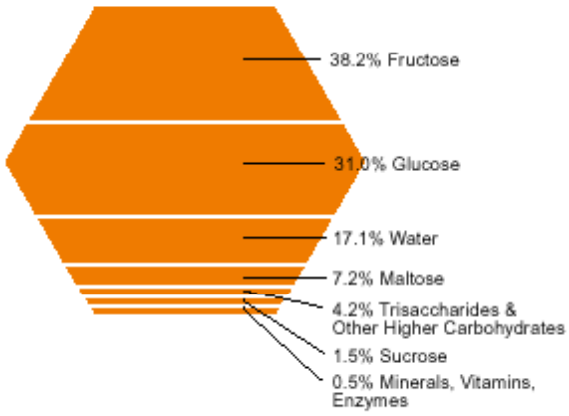
Stingless bees

- *Trigona sp.*

WHAT ARE THE SUBSTANCES IN HONEY?



HONEY COMPOSITION



(National Honey Board USA, 2002.)

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NUTRITION IN HONEY

(National Honey Board USA, 2002.)

Nutrient Values

Nutrient	Average amount per 1 Tbsp. serving (21 g)	Average amount per 100 g
Water	3.6 g	17.1 g
Total Carbohydrates	17.3 g	82.4 g
Fructose	8.1 g	38.5 g
Glucose	6.5 g	31.0 g
Maltose	1.5 g	7.2 g
Sucrose	0.3 g	1.5 g
Information for nutritional labeling		
Total Calories (kilocalories)	64	304
Total Calories (kilocalories) (from Fat)	0	0
Total Fat	0	0
Saturated Fat	0	0
Cholesterol	0	0
Sodium	0.6 mg	2.85 mg
Total Carbohydrates	17 g	81 g
Sugars	16 g	76 g
Dietary Fiber	0	0
Protein	0.15 mg	0.7 mg
Vitamins		
Thiamin	< 0.002 mg	< 0.01 mg
Riboflavin	< 0.06 mg	< 0.3 mg
Niacin	< 0.06 mg	< 0.3 mg
Biotin	Not available	Not available
Pantothenic Acid	< 0.05 mg	< 0.25 mg
Vitamin B-6	< 0.005 mg	< 0.002 mg
Folate	< 0.002 mg	< 0.01 mg
Vitamin B-12	Not available	Not available
Vitamin C	0.1 mg	0.5 mg
Vitamin A	0	0
Vitamin D	0	0
Vitamin E	0	0
Minerals		
Calcium	1.0 mg	4.8 mg
Iron	0.05 mg	0.25 mg
Zinc	0.03 mg	0.15 mg
Potassium	11.0 mg	50.0 mg
Phosphorous	1.0 mg	5.0 mg
Magnesium	0.4 mg	2.0 mg
Selenium	0.002 mg	0.01 mg
Copper	0.01 mg	0.05 mg
Chromium	0.005 mg	0.02 mg
Manganese	0.03 mg	0.15 mg
Ash	0.04 g	0.2 g

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HOLY QURAN: HONEY IS HEALING FOR MEN

Surah An-Nahl (No. 16) - Qari: Sh Saad Al-Ghamidi

وَمِن ثَمَرَٰتِ ٱلنَّخِيلِ وَٱلْأَعْنَـٰبِ تَتَّخِذُونَ مِنْهُ سَكَرًا وَرِزْقًا حَسَنًا ۗ إِنَّ فِى
ذَٰلِكَ لَءَايَةً لِّقَوْمٍ يَعْقِلُونَ ﴿٦٧﴾ وَأَوْحَىٰ رَبُّكَ إِلَى ٱلنَّحْلِ أَنِ ٱتَّخِذِى مِنَ
ٱلْجِبَالِ بُيُوتًا وَمِنَ ٱلشَّجَرِ وَمِمَّا يَعْرِشُونَ ﴿٦٨﴾ ثُمَّ كُلِى مِن كُلِّ ٱلثَّمَرَٰتِ
فَٱسْلُكِى سُبُلَ رَبِّكِ ذُلُلًا ۚ يَخْرُجُ مِنۢ بُطُونِهَا شَرَابٌ مُّخْتَلِفٌ أَلْوَٰنُهُۥ فِيهِ
شِفَآءٌ لِّلنَّاسِ ۗ إِنَّ فِى ذَٰلِكَ لَءَايَةً لِّقَوْمٍ يَتَفَكَّرُونَ ﴿٦٩﴾ وَٱللَّهُ خَلَقَكُمْ ثُمَّ
يَتَوَفَّىٰكُمْ ۚ وَمِنكُم مَّن يُرَدُّ إِلَىٰٓ أَرْذَلِ ٱلْعُمُرِ لِكَىْ لَا يَعْلَمَ بَعْدَ عِلْمٍ شَيْـًٔا ۚ

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67. And from the fruit of the date-palm and the vine, ye get out wholesome drink and food: behold, in this also is a sign for those who are wise.
68. And thy Lord taught the Bee to build its cells in hills, on trees, and in (men's) habitations;
69. Then to eat of all the produce (of the earth), and find with skill the spacious paths of its Lord: there issues from within their bodies a drink of varying colours, wherein is healing for men: verily in this is a Sign for those who give thought.

HADITH: HONEY AS MEDICINE

Hadith Sahih Bukhari Volume 7, Book 71, Number 584:
Narrated Abu Said Al-Khudri:

A man came to the Prophet and said, “My brother has some abdominal trouble.” The Prophet said to him, “Let him drink honey.”

The man came for the second time and the Prophet said to him, “Let him drink honey.”

The man came for the third time and the Prophet said to him, “Let him drink honey.”

He returned again and said," I have done that”.

The Prophet then said, “Allah has said the truth, but your brother’s abdomen has told a lie. Let him drink honey”.

So he made him drink honey and he was cured.

HOW COULD HONEY BE USEFUL IN VARIOUS KIND OF DISEASES?

- Honey heals, nourish and protects the body
  - Supply macro and micronutrients
  - Improve body immune system
  - Provide antioxidant and free radical scavenging activities
  - Has broad spectrum antibacterial activities
  - Has anti-inflammatory activities

TUALANG HONEY RESEARCH AT USM

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ANTIOXIDANT PROPERTIES OF TUALANG HONEY

Afr. J. Traditional, Complementary and Alternative Medicines
www.africanethnomedicines.net

Research Paper

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STUDIES ON THE ANTIOXIDANT PROPERTIES OF TUALANG HONEY OF MALAYSIA

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Abstract

Honey has been used since ancient times for its nutritional as well as curative properties. Tualang honey is collected from wild honey bees' hives on Tualang trees found in the Malaysian rain forest. It has been used traditionally for the treatment of various diseases, where its therapeutic value has partly been related to its antioxidant properties. This study therefore assessed the colour intensity, total phenolic content, antioxidant activity and antiradical activity of gamma irradiated Tualang Honey. The colour intensity at ABS_{450} was 489.5 ± 1.7 mAU, total phenolic content was 251.7±7.9 mg $_{gallic\ acid}$ /Kg honey, total antioxidant activity by FRAP assay was 322.1±9.7 (μM Fe(II)) and the antiradical activity by DPPH assay was 41.30 ± 0.78 (% inhibition). The data confirms that the

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ANTIOXIDANT PROPERTIES OF TUALANG HONEY

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Nutrition Research 31 (2011) 322–325

Nutrition Research

www.nrjournal.com

Tualang honey has higher phenolic content and greater radical scavenging activity compared with other honey sources

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Abstract

Many chronic diseases are associated with increased oxidative stress caused by an imbalance between free-radical production and the antioxidant level. Antioxidants, which are abundant in natural honey, are free-radical scavengers that either reduce the formation of or neutralize free radicals. The composition and source of honey greatly dictates its biochemical properties. We performed a comparative analysis of the total phenolic content and antioxidant potential of common commercially available honeys along with Malaysian tualang honey. In vitro biochemical analysis of the phenolic content by the Folin-Ciocalteau method revealed a significantly elevated phenolic content (83.96 ± 4.53 mg gallic acid equivalents per 100 g) in tualang honey. In addition, the antioxidant capacity (53.06 ± 0.41 mg ascorbic acid equivalents per gram) of tualang honey was greater, as assessed by the phosphomolybdenum method, 2,2-diphenyl-1-picryl-hydrazyl assay, and ferric reducing/antioxidant power assay. Peroxynitrite and superoxide radical scavenging activity was determined by spectrophotometric analysis in different honey types. Our data suggest that the elevated free-radical scavenging and antioxidant activity observed in tualang honey is due to the increased level of phenolic compounds. In addition to its antibacterial, anticarcinogenic, and anti-inflammatory properties, our study highlights the favorable antioxidant properties of tualang honey, which may be important to human nutrition and health.

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ANTIOXIDANT PROPERTIES OF TUALANG HONEY

Journal of ApiProduct and ApiMedical Science 3 (1): - (2011)
DOI 10.3896/IBRA.4.03.1.??

ORIGINAL RESEARCH ARTICLE

IBRA

Evaluation of radical scavenging activity and colour intensity of nine Malaysian honey of different origin

Md. Ibrahim Khalil[1], Mahaneem Mohamed[2], Syed Mohsin Sahil Jamalullail[3], Nadia Alam[4], Siti Amrah Sulaiman[1]*

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Summary

It is important to know the antioxidant properties of Malaysian honey of different sources to ensure their quality. In this study, we analysed nine common Malaysian honey and one Manuka honey to determine the total phenolics, flavonoids, antioxidant capacity and colour intensity. The Folin-Ciocalteu test was used to determine the total polyphenols content, ferric reducing antioxidant power (FRAP) assay for reducing capacity and 1,1-diphenyl-2-picryl-hydrazyl (DPPH˙) assays for radical scavenging capacity. The colour intensity measure, ABS_{450}, was used to approximate the contribution of coloured phytochemicals (carotenoids, flavonoids) to the overall antioxidant capacity of honey. The results showed that all the honey samples showed high content of phenolic compounds (876.58-166.97 mg GAE/kg) and high colour intensity (169.89 -740.59 mAU) but the results differ widely among the honey types. Out of nine honey samples, Tualang honey 1 and 2 have the highest content of polyphenols and have showed the highest colour intensity at ABS_{450}. All the honey samples tested have high antioxidant properties analysed by FRAP and DPPH˙ assay. Correlations between the parameters analysed were found to be statistically significant ($p < 0.01$). On the basis of employed analytical methods, the tested honey samples may be considered easily accessible natural sources of antioxidants and valuable additions to everyday diet. The results have shown that Tualang honey 1 and 2 are characterized by the highest total polyphenols content (876.58 mg GAE/kg and 652 mg GAE/kg), the highest reducing capacity (755.33 mM Fe(II) and 794.67 mM Fe(II)) and the best radical scavenging properties with respect to DPPH˙ (81.64% and 77.25%) in the analysed nine Malaysian honey samples. Radical scavenging activity and antioxidant properties of the honey samples have good correlation with polyphenols content and colour intensity.

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ANTIOXIDANT PROPERTIES OF TUALANG HONEY

6 *The Open Nutraceuticals Journal*, 2010, *3*, 6-16

Open Access

Antioxidant Properties of Honey and Its Role in Preventing Health Disorder

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Abstract: Honey is being used since long time both in medical and domestic needs, but only recently its antioxidant property has come to limelight. With increasing demand for antioxidant supply in the food, honey is becoming popular as a source of antioxidant since it is rich in phenolic acids and flavonoids and other antioxidants including glucose oxidase, catalase, ascorbic acid, carotenoid derivatives, organic acids, amino acids and proteins. The antioxidants have several preventative effects against different diseases like cancer, cardiovascular diseases, inflammatory disorders, neurological degeneration, wound healing, infectious diseases and aging, which led to search for foods rich in antioxidants. Various studies on antioxidant properties of honey have been done. The present article is a short review on the antioxidant properties of honey and its role against health disorder.

Keywords: Honey, Antioxidant, Phytochemicals, Health disorder.

INTRODUCTION

Mom always said, "Eat your fruits and vegetables, they'll help you grow big and strong." Although dietary recommendations have changed over the years, this is one bit of advice even Father Time can't ignore.

There is much information regarding the health benefits of honey but a little information is available about the antioxidant properties of honey and its role against different types of diseases. The objective of this review is to summarize antioxidant properties of honey and its role against health disorder like cancer, cardiovascular diseases, inflam-

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FREE RADICALS/OXIDATIVE STRESS RELATED DISEASES

- Cardiometabolic syndromes
  - diabetes mellitus
  - Hypertension
  - artherosclerosis

  →micro and macrovascular complication

  → renal, neuropathy, IHD,CVA
- Ageing (andropause, menopouse and their complications)
- Cancer

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ANTIOXIDANT & ANTIDIABETIC PROPERTIES OF TUALANG HONEY

74 Int. J. Vitam. Nutr. Res., 80 (1), 2010, 74 – 82

Original Communication

Hypoglycemic and Antioxidant Effects of Honey Supplementation in Streptozotocin-induced Diabetic Rats

Erejuwa O. Omotayo[1], Sunil Gurtu[1], Siti Amrah Sulaiman[1], Mohd Suhaimi Ab Wahab[1], Sirajudeen K.N.S[2] and Md. Salzihan Md. Salleh[3]

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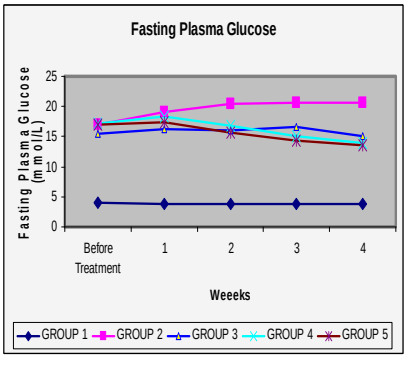
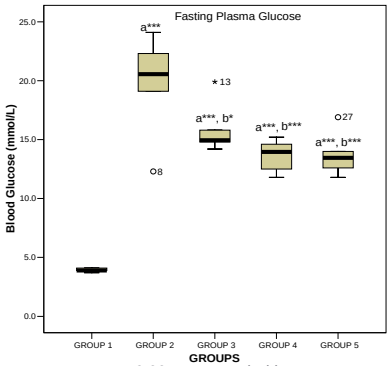
Antidiabetic and Antioxidant Effects AgroMas Tualang Honey in STZ-Induced Diabetic Rats

Weekly fasting blood sugar levels



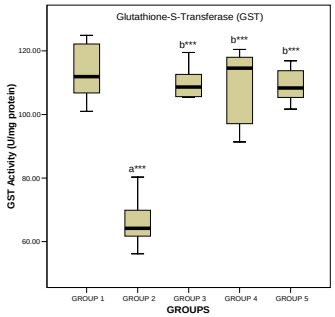
Fasting blood sugar at the end of the study



a * * * = p <0.001 compared with group 1
b *, b * * * = p <0.05 & p <0.001 respectively compared with group 2

Antidiabetic and Antioxidant Effects of AgroMas Tualang Honey in STZ-Induced Diabetic Rats

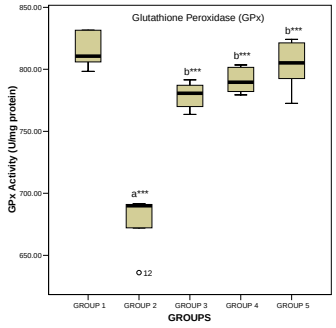
Kidney Glutathione-S-Transferase (GST)



1U = amount of enzyme that catalyzes the oxidation of 1 nmol of NADPH/min

a *** =*p* <0.001 compared with group 1;
b *** =*p* <0.001 compared with group 2

Kidney Glutathione Peroxidase (GPx)

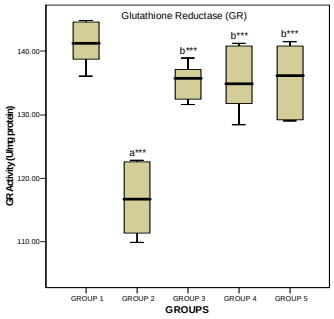


1U = amount of enzyme that catalyzes the oxidation of 1 nmol of NADPH/min

a *** =*p* <0.001 compared with group 1;
b *** =*p* <0.001 compared with group 2

Antidiabetic and Antioxidant Effects of AgroMas Tualang Honey in STZ-Induced Diabetic Rats

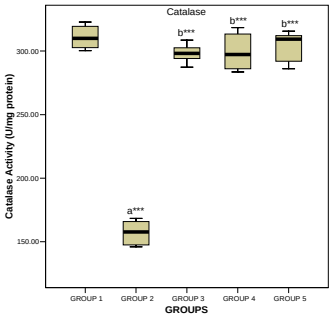
Kidney Glutathione Reductase (GR)



1U = amount of enzyme that catalyzes the oxidation of 1 nmol of NADPH/min

a *** =*p* <0.001 compared with group 1; b *** =*p* <0.001 compared with group 2

Kidney Catalase

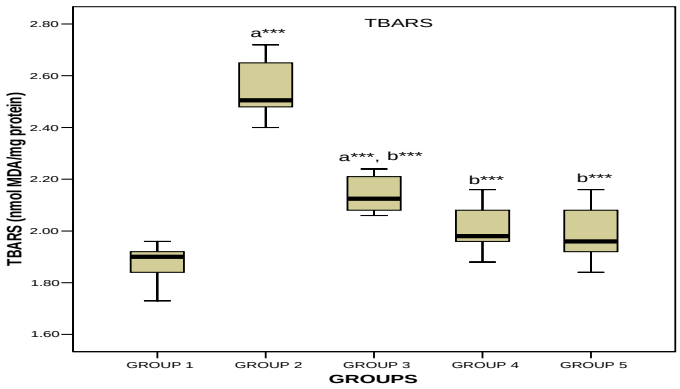


1U = amount of enzyme that catalyzes the decomposition of 1µmol of hydrogen peroxide/min

a*** = *p* <0.001 compared with group 1; b*** = *p* <0.001 compared with group 2

Antidiabetic and Antioxidant Effects of AgroMas Tualang Honey in STZ-Induced Diabetic Rats

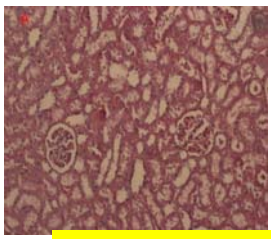
Kidney TBARS



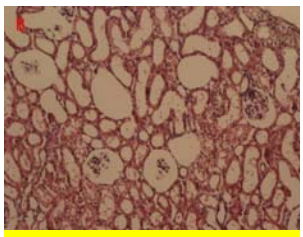
a*** =*p* <0.001 compared with group 1; b*** =*p* <0.001 compared with group 2

Antidiabetic and Antioxidant Effects of AgroMas Tualang Honey in STZ-Induced Diabetic Rats

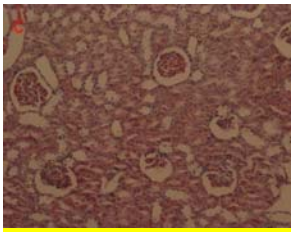
Histology of kidney



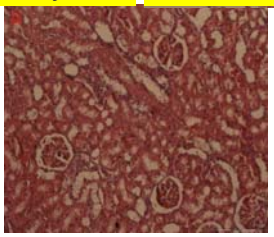
Control healthy



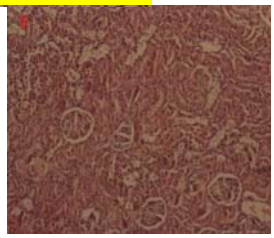
Control diabetic



Diabetic+low dose honey



Diabetic+mdm dose honey



Diabetic+high dose honey

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ANTIOXIDANT PROPERTIES OF TUALANG HONEY

Int. J. Mol. Sci. **2011**, *12*, 829-843; doi:10.3390/ijms12010829

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Article

Comparison of Antioxidant Effects of Honey, Glibenclamide, Metformin, and Their Combinations in the Kidneys of Streptozotocin-Induced Diabetic Rats

Omotayo Owomofoyon Erejuwa [1,*], Siti Amrah Sulaiman [1], Mohd Suhaimi Ab Wahab [1], Sirajudeen Kuttulebbai Nainamohammed Salam [2], Md Salzihan Md Salleh [3] and Sunil Gurtu [4]

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ANTIOXIDANT & ANTIDIABETIC PROPERTIES OF TUALANG HONEY

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Article

Antioxidant Protective Effect of Glibenclamide and Metformin in Combination with Honey in Pancreas of Streptozotocin-Induced Diabetic Rats

Omotayo Owomofoyon Erejuwa [1,*], Siti Amrah Sulaiman [1], Mohd Suhaimi Abdul Wahab [1], Kuttulebbai Nainamohammed Salam Sirajudeen [2], Md Salzihan Md Salleh [3] and Sunil Gurtu [4]

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Abstract

Diabetes mellitus is associated with deterioration of glycemic control and progressive metabolic derangements. This study investigated the effect of honey as an adjunct to glibenclamide or metformin on glycemic control in streptozotocin-induced diabetic rats. Diabetes was induced in rats by streptozotocin. The diabetic rats were randomized into six groups and administered distilled water, honey, glibenclamide, glibenclamide and honey, metformin or metformin and honey. The animals were treated orally once daily for four weeks. The diabetic control rats showed hypoinsulinemia (0.27 ± 0.01 ng/ml), hyperglycemia (22.4 ± 1.0 mmol/L) and increased fructosamine (360.0 ± 15.6 μmol/L). Honey significantly increased insulin (0.41 ± 0.06 ng/ml), decreased hyperglycemia (12.3 ± 3.1 mmol/L) and fructosamine (304.5 ± 10.1 μmol/L). Although glibenclamide or metformin alone significantly ($p < 0.05$) reduced hyperglycemia, glibenclamide or metformin combined with honey produced significantly much lower blood glucose (8.8 ± 2.9 or 9.9 ± 3.3 mmol/L, respectively) compared to glibenclamide or metformin alone (13.9 ± 3.4 or 13.2 ± 2.9 mmol/L, respectively). Similarly, glibenclamide or metformin combined with honey produced significantly ($p < 0.05$) lower fructosamine levels (301.3 ± 19.5 or 285.8 ± 22.6 μmol/L, respectively) whereas glibenclamide or metformin alone did not decrease fructosamine (330.0 ± 29.9 or 314.6 ± 17.9 μmol/L, respectively). Besides, these drugs or their combination with honey increased insulin levels. Glibenclamide or metformin combined with honey also significantly reduced the elevated levels of creatinine, bilirubin, triglycerides, and VLDL cholesterol. These results indicate that combination of glibenclamide or metformin with honey improves glycemic control, and provides additional metabolic benefits, not achieved with either glibenclamide or metformin alone.

Key words: Diabetes mellitus; streptozotocin; fructosamine; glibenclamide; metformin; tualang honey

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ANTIHYPERTENSIVE, ANTIDIABETIC & ANTIOXIDANT PROPERTIES OF TUALANG HONEY

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International Journal of
Molecular Sciences
ISSN 1422-0067
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Article

Differential Responses to Blood Pressure and Oxidative Stress in Streptozotocin-Induced Diabetic Wistar-Kyoto Rats and Spontaneously Hypertensive Rats: Effects of Antioxidant (Honey) Treatment

Omotayo O. Erejuwa [1,*], Siti A. Sulaiman [1], Mohd Suhaimi Ab Wahab [1], Kuttulebbai N. S. Sirajudeen [2], Md Salzihan Md Salleh [3] and Sunil Gurtu [4]

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EFFECTS OF TUALANG HONEY ON BONE

Journal of ApiProduct and ApiMedical Science 3 (1): 26 - 32 (2011)
DOI 10.3896/IBRA.4.03.1.05

ORIGINAL RESEARCH ARTICLE

Effect of a Combination of Jumping Exercise and Honey Supplementation on the Mass, Strength and Physical Dimensions of Bones in Young Female Rats

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Received 13 July 2010, accepted subject to revision 16 September 2010, accepted for publication 10 December 2010.

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Summary

The study investigated the effects of combined jumping exercise and honey supplementation on bone properties in young female rats. Forty eight 12- week old female rats were divided into four groups: control group (C), honey supplementation group (H), jumping group (J), and combined jumping and honey supplementation group (JH). Jumping exercise consisted of 40 jumps per day for 5 days per week at a height of 40 cm. Honey was supplemented to the rats at a dosage of 1g / kg body mass / rat / day via force feeding for 7 days per week. After 8 weeks

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EFFECT OF TUALANG HONEY ON BONE & REPRODUCTIVE HEALTH

Zaid *et al. BMC Complementary and Alternative Medicine* 2010, 10:82
http://www.biomedcentral.com/1472-6882/10/82

BMC Complementary & Alternative Medicine

RESEARCH ARTICLE Open Access

The effects of tualang honey on female reproductive organs, tibia bone and hormonal profile in ovariectomised rats - animal model for menopause

Sid SM Zaid[1†], Siti A Sulaiman[2†], Kuttulebbai NM Sirajudeen[3†], Nor H Othman[4*†]

Background: Honey is a highly nutritional natural product that has been widely used in folk medicine for a number of therapeutic purposes. We evaluated whether Malaysian Tualang honey (AgroMas, Malaysia) was effective in reducing menopausal syndrome in ovariectomised female rats; an animal model for menopause.

Methods: The rats were divided into two control groups and three test groups. The control groups were sham-operated (SH) and ovariectomised (OVX) rats. The SH and OVX control rats were fed on 0.5 ml of distill water. The rats in the test groups were fed with low dose 0.2 g/kg (THL), medium dose, 1.0 g/kg (THM) and high dose 2.0 g/kg (THH) of Tualang honey in 0.5 ml of distill water. The administration was given by oral gavage once daily for 2 weeks. The reproductive organs (uterus and vagina), tibia bone and aorta were taken for histopathological examination while serum for hormonal assays.

Results: Administration of Tualang honey for 2 weeks to ovariectomised rats significantly increased the weight of the uterus and the thickness of vaginal epithelium, restored the morphology of the tibia bones and reduced the body weight compared to rats in the ovariectomised group. The levels of estradiol and progesterone, in honey treated groups were markedly lower than that in the OVX group. At low doses (0.2 g/kg; THL group) of Tualang honey there was an increased in serum free testosterone levels compared to OVX group ($P < 0.01$). Progesterone concentrations was significantly decreased in the OVX group as compared to SHAM group ($P < 0.05$).

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EFFECT OF TUALANG HONEY ON MALE HEALTH

Journal of ApiProduct and ApiMedical Science 3 (1): 12 - 17 (2011)
DOI 10.3896/IBRA.4.03.1.03

ORIGINAL RESEARCH ARTICLE

Effect of Honey on Testicular Functions in Rats Exposed to Cigarette Smoke

Mohamed Mahaneem[1*], Siti Amrah Sulaiman[2], Hasnan Jaafar[3], Kuttulebbai Nainamohamed Salam Sirajudeen[4], Zul Izhar Mohd Ismail[5] and Mohammed Nazrul Islam[6]

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Summary

Honey is traditionally consumed by the local Malaysian population as a nutrient, as well as for the enhancement of fertility. The decline in male reproductive health and fertility in the last 30 years has been linked to environmental toxicants including cigarette smoke (CS). In human and experimental studies, CS exposure has been associated with decreased plasma testosterone level, lower sperm count and increased percentage of abnormal sperm. The aim of this study, therefore, was to determine the possible protective role of honey against the toxic effects of CS on testicular functions in rats. Thirty-two adult Sprague-Dawley rats were randomly divided into 4 groups (8 rats per group) i.e. control group, honey-treated group (H), cigarette smoke-exposed group (CS) and honey-treated plus CS-exposed group (H+CS). Rats in

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ANTIBACTERIAL PROPERTIES OF TUALANG HONEY

BMC Complementary and Alternative Medicine

BioMed Central

Research article

Open Access

The antibacterial properties of Malaysian tualang honey against wound and enteric microorganisms in comparison to manuka honey

Hern Tze Tan[1], Rosliza Abdul Rahman[1], Siew Hua Gan[2], Ahmad Sukari Halim[3], Siti Asma' Hassan[1], Siti Amrah Sulaiman[2] and Kirnpal-Kaur BS*[1]

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This article is available from: http://www.biomedcentral.com/1472-6882/9/34

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TUALANG HONEY AND RESPIRATORY SYMTOMS

Journal of ApiProduct and ApiMedical Science 3 (1): 38 - 44 (2011)
DOI 10.3896/IBRA.4.03.1.07

ORIGINAL RESEARCH ARTICLE

The Benefit of Tualang Honey in Reducing Acute Respiratory Symptoms Among Malaysian Hajj Pilgrims: A Preliminary Study

Siti Amrah Sulaiman[1], Habsah Hasan[2], Zakuan Zainy Deris[2], Mohd Suhaimi Abdul Wahab[1], Ruhana Che Yusof[3], Nyi Nyi Naing[3] and Nor Hayati Othman[4*]

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Summary

Acute respiratory symptoms such as cough, rhinitis, sore throat and fever are one of the main health problems encountered by pilgrims performing Hajj in Mekah. The possible causes include over-crowding and low immune status as a result of stress. Honey is reputed to contain multiple chemical compounds that are capable of enhancing the immune system and has antibacterial, antiviral and antifungal properties. We determined the effectiveness of Malaysian multi floral wild honey "Madu Lebah Tualang - Agromas" in reducing acute respiratory symptoms amongst Hajj pilgrims. A non-randomized control trial was conducted among Hajj pilgrims during the 2007 Hajj season. The intervention group was given two kilograms of honey and they were requested to consume 20 g of the honey twice daily throughout the 42 day Hajj journey (from Malaysia to Mekah and back), and to record any respiratory symptoms in the Health Diary provided. The number of

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WOUND HEALING PROPERTIES OF TUALANG HONEY

Diabetic wounds | Burn wounds | Radiation mucositis



- Honey has anti-inflammatory, anti-bacterial and wound healing enhancement properties
- Its acidity with high sugar content, together with the presence of furfural compounds and hydrogen peroxide, are believed to contribute to its superior antibacterial properties

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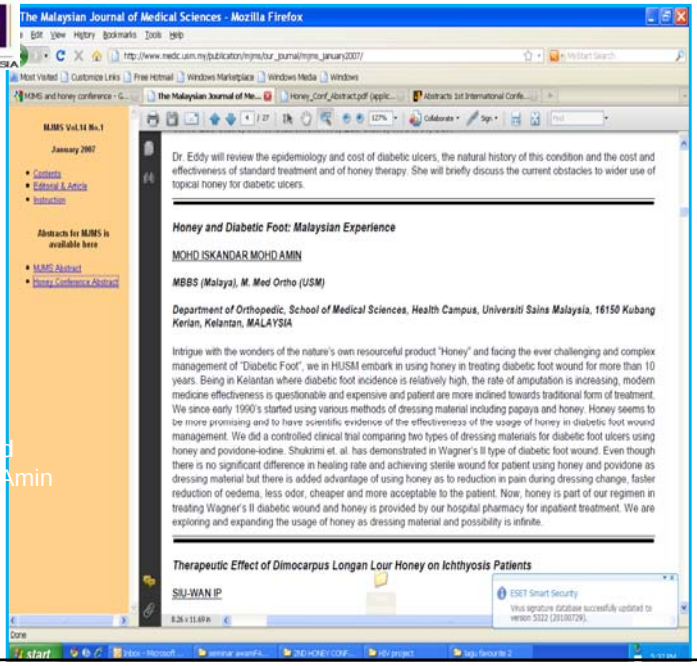

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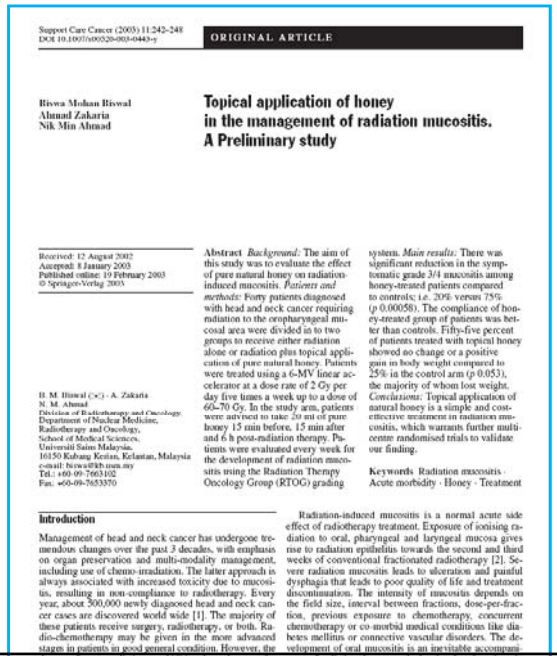

Support Care Cancer (2003) 11:242–248
DOI 10.1007/s00520-003-0443-y

ORIGINAL ARTICLE

Rivwa Mohan Biswal
Ahmad Zakaria
Nik Min Ahmad

Topical application of honey in the management of radiation mucositis. A Preliminary study

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Abstract *Background:* The aim of this study was to evaluate the effect of pure natural honey on radiation-induced mucositis. *Patients and methods:* Forty patients diagnosed with head and neck cancer requiring radiation to the oropharyngeal mucosal area were divided in to two groups to receive either radiation alone or radiation plus topical application of pure natural honey. Patients were treated using a 6-MV linear accelerator at a dose rate of 2 Gy per day five times a week up to a dose of 60–70 Gy. In the study arm, patients were advised to take 20 ml of pure honey 15 min before, 15 min after and 6 h post-radiation therapy. Patients were evaluated every week for the development of radiation mucositis using the Radiation Therapy Oncology Group (RTOG) grading system. *Main results:* There was significant reduction in the symptomatic grade 3/4 mucositis among honey-treated patients compared to controls; i.e. 20% versus 75% (p 0.00058). The compliance of honey-treated group of patients was better than controls. Fifty-five percent of patients treated with topical honey showed no change or a positive gain in body weight compared to 25% in the control arm (p 0.053), the majority of whom lost weight. *Conclusions:* Topical application of natural honey is a simple and cost-effective treatment in radiation mucositis, which warrants further multicentre randomised trials to validate our finding.

Keywords Radiation mucositis · Acute morbidity · Honey · Treatment

Introduction

Management of head and neck cancer has undergone tremendous changes over the past 3 decades, with emphasis on organ preservation and multi-modality management, including use of chemo-irradiation. The latter approach is always associated with increased toxicity due to mucositis, resulting in non-compliance to radiotherapy. Every year, about 300,000 newly diagnosed head and neck cancer cases are discovered world wide [1]. The majority of these patients receive surgery, radiotherapy, or both. Radio-chemotherapy may be given in the more advanced stages in patients in good general condition. However, the

Radiation-induced mucositis is a normal acute side effect of radiotherapy treatment. Exposure of ionising radiation to oral, pharyngeal and laryngeal mucosa gives rise to radiation epithelitis towards the second and third weeks of conventional fractionated radiotherapy [2]. Severe radiation mucositis leads to ulceration and painful dysphagia that leads to poor quality of life and treatment discontinuation. The intensity of mucositis depends on the field size, interval between fractions, dose-per-fraction, previous exposure to chemotherapy, concurrent chemotherapy or co-morbid medical conditions like diabetes mellitus or connective vascular disorders. The development of oral mucositis is an inevitable accompani-

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WOUND HEALING PROPERTIES OF TUALANG HONEY

Journal of ApiProduct and ApiMedical Science 3 (1): 45 - 53 (2011)
DOI 10.3896/IBRA.4.03.1.08

ORIGINAL RESEARCH ARTICLE

The Efficacy of Tualang Honey in Comparison to Silver in Dressing Wounds in Rats

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Summary

Tualang honey is obtained from large honeycombs produced by Asian bees (*Apis dorsata*) in gigantic Tualang trees. It has been used traditionally by local communities to treat wounds. However, unlike manuka honey its medicinal uses are not well researched. An open, prospective study into the efficacy of wound healing in full thickness wounds in rats, was designed to compare two honey impregnated dressings with silver-impregnated hydrofibre dressings. A full-thickness wound was created on the dorsum of Sprague-Dawley rats (n=45). Tualang honey impregnated paraffin tulle (P-honey) and tualang honey impregnated hydrofibre dressings (H-honey) were compared with silver-containing hydrofibre dressing (positive control; H-Ag). The wounds were inspected on days 4, 7, 14, 21 and 28. The dressings and wounds were assessed for adherence, ease of removal, fluid accumulation, dryness of skin and exudates, rate of epithelization, healing and wound contraction. Three rats treated with each dressing were sacrificed on the days that wounds were inspected. The wounds and scars were histologically analysed for inflammatory parameters. Tualang honey impregnated dressings were comparable to the commercially available silver impregnated hydrofibre dressing in terms of adherence, ease of removal, fluid accumulation, dryness of surrounding skin and exudates; $p > 0.05$ for non-parametric Kruskal-Wallis tests and post hoc corrections with a Mann-Whitney test. The rates of wound healing, wound contracture and subsequent histological analysis of inflammatory reaction by each dressing were also comparable. Tualang honey impregnated dressings were as effective as silver impregnated hydrofibre dressings in terms of dressing properties, promotion of wound healing and inflammatory reaction.

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WOUND HEALING PROPERTIES OF TUALANG HONEY

Journal of ApiProduct and ApiMedical Science 3 (1): 33 - 37 (2011)
DOI 10.3896/IBRA.4.03.1.06

ORIGINAL RESEARCH ARTICLE

Tualang Honey Hydrogel in the Treatment of Split-Skin Graft Donor Sites

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Received 24 May 2010, accepted subject to revision 29 July 2010, accepted for publication 16 September 2010.

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Summary

Hydrogel is a an established wound dressing. In this prospective single arm study the benefits conferred when tualang honey was added to a hydrogel dressing were investigated with regards to the healing of split skin graft donor sites. Efficacy was evaluated by examining rates of wound healing and pain during the healing of split-skin graft donor using Tualang Honey Hydrogel. Patients who underwent split skin grafting were screened and those who met the inclusion criteria were recruited from the patient population in Hospital Universiti Sains Malaysia (HUSM) over a period of 18 months. Individual informed consent was obtained from each patient. Thirty-five patients received Honey Hydrogel dressing applied to their split skin graft donor sites. All donor sites were inspected on the 10, 15 and 20th post-operative day. Complete healing between post-operative day 10 and post-operative day 15 was observed, with minimal pain, discomfort and pruritus. Honey Hydrogel may be effective in the treatment of split-skin graft donor sites, warranting further studies to compare it with existing dressing

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WOUND HEALING PROPERTIES OF TUALANG HONEY

Journal of ApiProduct and ApiMedical Science 3 (1): 18 - 25 (2011)
DOI 10.3896/IBRA.4.03.1.04

ORIGINAL RESEARCH ARTICLE

A Randomized Control Trial Comparing the Effects of Manuka Honey and Tualang Honey on Wound Granulation of Post Debridement Diabetic Foot Wounds

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Received 07 July 2010, accepted subject to revision 11 November 2010, accepted for publication 24 November 2010.

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Summary

The concern of a surgeon dealing with the management of diabetic ulcers is to get the wound debrided and dressed until it granulates. After this stage a proper tissue cover with skin graft is among the options available to encourage the wounds to heal. A resurgence of interest and an increasing number of case reports on the use of honey on diabetic foot ulcers, reflect a growing awareness and a need for cost-effective therapies. Given honey's great potential as an alternative in wound dressing, this double-blinded randomized controlled study was designed to investigate the wound healing property and the granulation tissue promoting effect of honey, comparing the local Malaysian tualang honey with the well-established manuka honey in the management of patients with diabetic foot wounds. Thirty-four patients with Wagner stage II or III diabetic foot ulcers were enrolled in the study, randomized into 2 groups of seventeen patients, treated with either manuka honey or tualang honey dressing on a daily basis post surgical debridement. Wound healing was assessed by measuring the granulation surface area

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ANTICANSER PROPERTIES OF TUALANG HONEY

Food and Chemical Toxicology 49 (2011) 871–878

Contents lists available at ScienceDirect

Food and Chemical Toxicology

journal homepage: www.elsevier.com/locate/foodchemtox

Tualang honey induces apoptosis and disrupts the mitochondrial membrane potential of human breast and cervical cancer cell lines

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Apoptosis
Cytotoxicity
Lactate dehydrogenase
Annexin V
Cancer cell lines

ABSTRACT

Honey is reported to contain various compounds such as phenols, vitamins and antioxidants. The present study investigates the anticancer potential of *Tualang* honey (Agromas) (TH) in human breast (MCF-7 and MDA-MB-231) and cervical (HeLa) cancer cell lines; as well as in the normal breast epithelial cell line, MCF-10A. The cells were treated with increasing doses of TH (1–10%) for up to 72 h. Increase in lactate dehydrogenase (LDH) leakage from the cell membranes indicates that TH is cytotoxic to all three cancer cells with effective concentrations (EC_{50}) of 2.4–2.8%. TH is however, not cytotoxic to the MCF-10A cells. Reactivity with annexin V fluorescence antibody and propidium iodide as analysed by flow cytometry and fluorescence microscopy shows that apoptosis occurred in these cancer cells. TH also reduced the mitochondrial membrane potential ($\Delta\Psi_m$) in the cancer cell lines after 24 h of treatment. The activation of caspase-3/7 and -9 was observed in all TH-treated cancer cells indicating the involvement of mitochondrial apoptotic pathway. This study shows that TH has significant anticancer activity against human breast and cervical cancer cell lines.

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ANTICANSER PROPERTIES OF TUALANG HONEY

Ghashm et al. BMC Complementary and Alternative Medicine 2010, 10:49
http://www.biomedcentral.com/1472-6882/10/49

BMC Complementary & Alternative Medicine

RESEARCH ARTICLE Open Access

Antiproliferative effect of Tualang honey on oral squamous cell carcinoma and osteosarcoma cell lines

Abdulmlik A Ghashm[1], Nor H Othman[2], Mohammed N Khattak[2], Noorliza M Ismail[1], Rajan Saini[1*]

Abstract

Background: The treatment of oral squamous cell carcinomas (OSCC) and human osteosarcoma (HOS) includes surgery and/or radiotherapy which often lead to reduced quality of life. This study was aimed to study the antiproliferative activity of local honey (Tualang) on OSCC and HOS cell lines.

Methods: Several concentrations of Tualang honey (1% - 20%) were applied on OSCC and HOS cell lines for 3, 6, 12, 24, 48 and 72 hours. Morphological characteristics were observed under light and fluorescent microscope. Cell viability was assessed using MTT assay and the optical density for absorbance values in each experiment was measured at 570 nm by an ELISA reader. Detection of cellular apoptosis was done using the Annexin V-FITC Apoptosis Detection Kit.

Results: Morphological appearance showed apoptotic cellular changes like becoming rounded, reduction in cell number, blebbed membrane and apoptotic nuclear changes like nuclear shrinkage, chromatin condensation and fragmented nucleus on OSCC and HOS cell lines. Cell viability assay showed a time and dose-dependent inhibitory effect of honey on both cell lines. The 50% inhibitory concentration (IC_{50}) for OSCC and HOS cell lines was found to be 4% and 3.5% respectively. The maximum inhibition of cell growth of ≥80% was obtained at 15% for both cell lines. Early apoptosis was evident by flow cytometry where percentage of early apoptotic cells increased in dose and time dependent manner.

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ANTICANSER PROPERTIES OF TUALANG HONEY

Tumors appeared as soft and fleshy type of mass (Russo and Russo, 2000).

Dilation of blood vessel (arrow) which seen connected to the tumor

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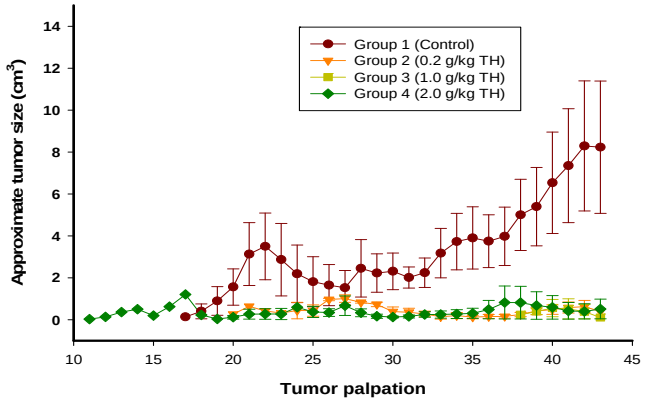
TUMOR PROGRESSION



Tumor size (volume) in approximation (cm^3) measured twice a week after detected during post-DMBA weeks. Data presented as mean ± SEM.

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TUMOR APPEARANCE

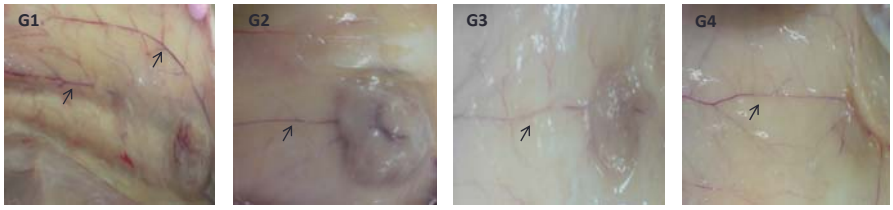

Figure 4: Dilatation of blood vessels (arrow) could be seen clearly on rat mammary pad from control group (G1) compared to TH-treated groups. Tumors (right-bottom side of picture) were seen connected to the vessels. G1= Control, G2 = 0.2 g/kg TH, G3 = 1.0 g/kg TH, G4 = 2.0 g/kg TH.

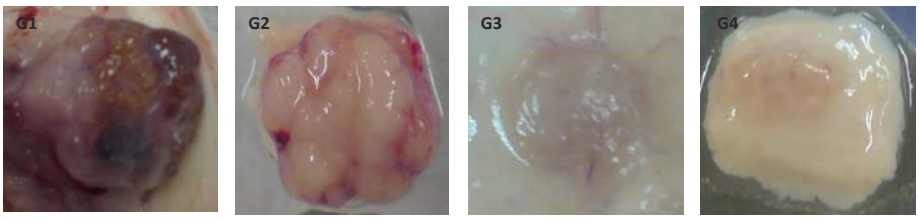

Figure 5: Tumor mass appearance as inspected during autopsy from control and TH-treated groups. G1= Distilled water, G2 = 0.2 g/kg/day TH, G3 = 1.0 g/kg/day TH, G4 = 2.0 g/kg/day TH

Other honey researches and publications

- Honey and cognitive function (AP Dr. Rahimah)
- Honey and postmenapausal symptoms (Prof Nik Hazlina)
- Honey and subfertility (Prof Shaiful Bahari)
- Honey in pregnancy (Dr. Mahaneem)
- Honey as antiinflammatory and analgesics (Dr. Cik Badariah)
- Honey in breast cancer animal model (Prof Nor Hayati)
- Honey in cancer cell lines (Prof Nik Soriani)

- Researches on honey from UKM, UTM and other institutions

WHAT NEXT?

- Encourage people to consume honey
- Use honey as therapeutic agents
- Beekeeping for farmers

THANK YOU