ABSTRACTS

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Oral Presentation

FP01

An *in-vitro* model for the use of Egyptian bee honey and royal jelly in cases of premature rupture of the fetal membranes (PROM)

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BACKGROUND: Cases of premature rupture of the fetal membranes (PROM) are very critical with high incidence of fetal mortality. Until now, there is no definitive prophylaxis for these cases. We present an in-vitro model objectively testing the effect of Egyptian bee honey (H) and royal jelly (RJ) on the mechanical properties of the fetal membranes.

METHODS: Amnion (A) and amnion/chorion complexes (B) of fetal membranes were collected from 138 delivered women following normal labor and PL/PROM. Membrane pieces were treated with either H, RJ, H/RJ mixture (cases), or physiologic saline (controls). The membranes were subsequently evaluated by: a) a manometric device for their mechanical properties, and, b) histological examination for the collagen content.

RESULTS: The tearing pressure and the elastic extension yield were significantly improved for both A (pressure of 105.7 with H and 146.5 for RJ versus 50.3 mm Hg for the controls; and elastic extension yield of 1.73 with H and 1.93 for RJ versus 1.46 cm for the controls); and B membranes (pressure of 190.7 mm Hg with H and 246.5 for RJ versus 121.2 mm Hg for the controls; elastic extension yield of 2.01 with H, 2.05 with RJ, versus 1.83 cm for the controls). Histological examination and image-analysis quantification revealed significantly increased collagen staining pattern, too.

CONCLUSION: H, H/RJ has positive effect on the mechanical properties of the fetal membranes. This may be through "collagen promoting action".

FP02

Egyptian bee honey and propolis for recurrent intractable childhood candidal vulvovaginitis

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BACKGROUND: Recurrent childhood candidal vulvovaginitis is a difficult clinical problem. Egyptian propolis has strong in-vitro antifungal activity, including candida species. Egyptian bee honey is known of its powerful anti-inflammatory and antimicrobial actions. The work targeted to evaluate the in vivo effect of local application of egyptian bee honey (ebh) and egyptian propolis (ep) in cases of resistant recurrent childhood candidal vulvovaginitis.

METHODS: Sixty two female children ranging between 4 and 9 years age, with recurrent vulvovaginal candidiasis were treated using the *ebh/ep* mix. The mix was composed of ethanol extract of ep and egyptian trifolium-cotton honey. It was diluted in 200 ml of pre-bolied water and was used as twice daily external vulvovaginal lavage for 7 days. Besides, children were also let to set in *ebh/ep* filed basin twice daily for 10

minutes. This group was compared to another group of 70 children who received conventional antimycotic therapy (fluconazole, clotrimazole, itraconazole). The two groups were compared for symptomatic improvement, mycological cure, and rate of recurrence.
RESULTS: *Ebh/ep* use was associated with: 1) better symptom control (83%; 50.2%), 2) better mycological cure (74%; 35%), and, 3) much less rate of recurrent acute episodes (13%; 49%). No side effects were noted.
CONCLUSION: *Ebh/ep* is an effective treatment to for children with recurrent intractable candidal vulvovaginitis. This might be encouraging for further trials, and for formulating systemic *ebh/ep* preparations for this purpose.

FP03

Title: A pilot study on the usage of Honey Hydrogel and Safecare Hydrogel dressing in the treatment of split skin graft donor sites

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BACKGROUND: A pilot study was performed to investigate two dressing materials with regards to their healing of split skin graft donor sites.
METHODS: Patients who undergo split skin grafting were screened for this study. They were required to meet the inclusion & exclusion criteria. Using simple randomisation, 50 patients were assigned into 2 groups, 25 patients received commercially available Safecare Hydrogel dressing and 25 received Honey Hydrogel dressing applied to their split skin graft donor sites. All donor sites are inspected on the 5th, 10th and 15th post-operative day. The parameters assessed are wound healing, pain assessment and complication rates.
RESULTS: There was a difference observed in both the healing rates and pain assessment between both groups. There with 99.8% wound healing rate in the Honey Hydrogel group versus 96% in the Safecare hydrogel group. The discomfort level was less with the Honey Hydrogel group, requiring less analgesia than the Safecare Hydrogel group.
CONCLUSION**:** The results prove the initial study hypothesis that Honey Hydrogel is better than Safecare Hydrogel in optimizing the healing of split skin graft donor sites. This is an ongoing study so the effectiveness of Honey Hydrogel is continually being investigated.

FP04

Self-reported use of natural preparations in treating diabetic foot disorders by a cohort of Saudi diabetics in Jeddah, Western Saudi Arabia

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BACKGROUND: There is lack of information about the current Saudi diabetics' habits, practices and beliefs when they are exposed to foot disorders such as open wound, ulcer, infected in-growing nail…etc. These factors are usually influenced by local culture and communities beliefs about the role of certain natural products and preparations such as honey, natural products and/or local herbs. The objective of this study is to identify the local pattern of patients' use of natural preparations in dealing with diabetic foot disorders in a cohort of Saudi diabetics in Jeddah, Saudi Arabia.
METHODS: This is a cross sectional study on a cohort of diabetics. A pre-designed questionnaire to identify local diabetics' practices in dealing with any foot complication was designed. The questionnaire was piloted on a group of diabetics prior to administration. Questionnaire was administered to representative sample of diabetics and filled by a group of trained nutrition female.
RESULTS: A total of 1634 Saudi known diabetics were interviewed. The mean age accounted for 49 + 17 years. The median number of times for frequency of foot disorders was 2 times. It was noted that 307 (47.1%) of the patients indicated that they used medical treatment alone, and 142 (21.7%) addressed that used traditional treatment alone, while more than one third of the patients who had foot ulcers (31.2%) used combined treatment. The most commonly used natural preparations for treatment of diabetic foot ulcers was honey as more than half of the diabetic patients (56.6%) who had history of foot ulcers/disorders indicated that they have used honey for dealing with it. In addition, ten common combinations of natural preparations used for treating diabetic foot ulcers were identified. The commonest combination was (Honey and Black seeds) (19.1%), followed by the combination of Honey and Myrrh (12.1%).
CONCLUSION: The use of natural preparations in treating diabetic foot disorders is fairly common among Saudi diabetics. Honey headed the list as a solo topical preparation or in combination with other herbs namely black seeds and myrrh.

FP05

The effects of Tualang Honey on postmenopausal women

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INTRODUCTION: Results of recent trial have shown some negative effects of hormone replacement therapy on postmenopausal women. Therefore there has been a move towards using alternative medicine as a treatment for menopausal problems and honey is one of the alternative.

OBJECTIVE: To investigate the effects of Tualang Honey on the safety profiles, cardiovascular risk factors, changes in hormones and also bone and fat loss.

METHODS: A randomized, placebo-controlled trial comparing the effects of Tualang Honey 20 mg/day for a 4-month intervention period among healthy post-menopausal Malay women aged 45-60 years old was conducted. The primary outcome measures were to evaluate changes from baseline on the safety profiles, cardiovascular risk factors, hormonal profiles and bone loss of Tualang honey as compared to control. Analysis of covariance (ANCOVA) was performed to evaluate the difference between groups at the study end-point with baseline scores as co-variates.

RESULTS: Fourty and 39 women were randomly assigned to Tualang Honey and placebo group respectively with no statistical difference in socio demographic, anthropometrics and duration of menopause. Majority (64.3%) reported per vaginal spotting and 35.7% reported per vaginal bleeding from the HRT group. There was no episode of per vaginal bleeding among the honey treated group. There were no difference in the bone densitometry and cardiovascular risk factor in the honey and hormone replacement therapy group. There were also no significant changes in safety parameters such as liver enzymes, serum creatinine and uric acid in the two randomized groups. The was improvement of FSH, LH and oestradiol levels in the HRT group.

CONCLUSION: Daily intake of Honey at 20 mg/day for four month was found to be safe to use and have the same effect on bone densitometry when compared with hormone replacement therapy.

FP06

Post-cauterization application of Egyptian bee honey for resistant cervicitis as sole reason for infertility

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BACKGROUND: In many cases of chronic endocervicitis, there are the unsolved problems of resistance, poor post-cauterization healing, recurrence and poor fertility outcome.

OBJECTIVE: We tried to elucidate the therapeutic value of Egyptian bee honey as post-cauterization intracervical application for infertility due to resistant cervicitis.

METHODOLOGY: Sixty patients of resistant, recurrent and unhealed chronic cervicitis as sole reason for infertility have been randomly assigned, into two groups for either cauterization followed by immediate and late intracervical bee honey application under ultrasonographic guidance (Group I), or cauterization alone (Group II). The tested parameters were:1) clinical cure of cervicitis, 2) recurrence rate, 3) healing within 4 weeks, and, 4) occurrence of pregnancy within one year for sub-fertile cases with resistant cervicitis as the sole reason.

RESULTS: Group I patients have got significantly:

a) superior rates of clinical cure including: improvement of the discharge complaint 23/30 (77%) versus 7/30 (23%) for group II**;** $P < 0.01$; pain reduction 13/30 (43%) versus 3/30 (10%); $P<0.01$; better healing rate within 4 weeks, 29/30 (97%), versus 13/30 (43%)' $P < 0.05$; less recurrence 4/30 (13%) versus 17/30 (57%); $P<0.1$, and;

b) better fertility outcome with a pregnancy rate of 59% versus 24%; $P<0.05$.

CONCLUSION: Intracervical Egyptian bee honey injection is of positive therapeutic value for cases of chronic endocervitis, both in terms of clinical cure and fertility enhancement.

FP07

Wound contraction and anti-microbial properties of Tualang honey on full thickness burn wound in rats

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BACKGROUND: Full thickness burn wounds require excision and skin grafting. Wound bed preparations prior to surgery are necessary in order to prevent wound infection and promote wound healing. Honey can be used to treat burn wound. But, not all honey is the same. This study is to evaluate the effectiveness and properties of locally produced Tualang honey on managing full thickness burn wound in vivo.

OBJECTIVES: To evaluate the wound contraction and antimicrobial properties of Tualang honey in full thickness burn wound in Sprague Dawley rats model, in comparison to Aquacel-Ag® and Aquacel plain dressings.

METHODS: Thirty-six Sprague Dawley rats were randomly divided into three groups. Under anesthesia, three full thickness burn wounds were created on the dorsum of rats. The full thickness burn wounds were inoculated with a specific organism (104) namely: *Pseudomonas aeruginosa* (n=12), *Klebsiella pneumoniae* (n=12)*, Acinetobacter baumannii* (n=12)*.* The three burn wounds were dressed with Tualang honey, Aquacel Plain and Aquacel-Ag® respectively. Swab samples were obtained every 3 days (day 3, 6, 9,12,15,18 and 21) for quantitative and semi-quantitative microbiological analyses. Clinical assessments include observations concerned the appearance and wound size was measured at the same time.

RESULTS: Rapid reduction in wound size of 32.26% by day 6 (p = 0.008) in the Tualang honey-treated wounds, and 49.27% by day 15 (p = 0.005). The wounds remained smaller among the Tualang honey-treated wounds than in the Aquacel-Ag® and Aquacel Plain treated wounds by day 18 (p = 0.032). In Tualang honey-treated rats demonstrated reduction in bacterial growth compared to Aquacel-Ag® and Aquacel Plain in *Pseudomonas aeruginosa* inoculated wounds (p = 0.005). However, Aquacel-Ag® and Aquacel Plain treated wounds are superior to honey-treated wounds in *Acinetobacter baumannii* (p = 0.035). There was no statistically significant between the three dressing materials used in *Klebsiella pneumoniae* inoculated wounds.

CONCLUSION: Tualang honey has better results as regards to its wound contraction effects on full thickness burn wound in vivo and its control on *Pseudomonas aeruginosa*.

FP08

Applications of repellents in beekeeping

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BACKGROUND: Beneficial insects such as pollinators are very sensitive to pesticides. The aim of this study was to find useful repellents for the safety and conservation of pollinators especially honey bees from pesticide hazards during flowering season.

METHODS: Workers of Four colonies were placed in different geographical directions (North, South, East, and West) and then they were taught for feeding of centre station. A vial was attached to food container that contained somewhat of cotton. In each test, chemicals were added to syrup (inside of food container) and pour to vial (on cotton). Sampling was done twice a day (11am and 14pm) to assess the effect of environmental temperature too. The design of this experiment was factorial split in the form of randomized block.

RESULTS: Application of chemical repellent compounds could be one of the best methods for pollinator's protection from pesticide injuries. In the preliminary study, screening of several chemicals showed that amine and ester groups have high potential power as repellent for honey bees from feeding stations.

CONCLUSION: It is recommended to use these compounds for conservation of pollinators and probably other beneficial insects in the farm. Moreover, as an idea, these chemical repellents might be useful to protect beekeeper during honey harvesting and colony survey. It is suggested that the supplementary studies might reveal these ideas.

FP09

Tibial bone densitometry and geometry in response to combined jumping exercise and honey supplementation in young female rats

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BACKGROUND: This study investigates the effects of 8 weeks of jumping exercise and honey supplementation on tibial bone mineral density (BMD) and geometry in young female rats.

METHODS: Forty eight 12-week old female rats were divided into four groups: Sedentary without supplementation control group (C), sedentary with honey supplementation group (H), jumping exercise group (J), and combined jumping exercise and honey supplementation group (JH). Jumping exercise consisted of 40 J/day for 5 days/week at the height of 40 cm. Oral honey supplementation was given to the rats at the dosage of 1g/kg body weight/rat/day, for 7 days/week. At the end of the study, proximal volumetric total BMD, trabecular BMD, mid shaft cortical volumetric BMD, cross-sectional area, and cross-sectional moment of inertia (CSMI) of the left tibia were measured for comparison. Data were analysed using one-way ANOVA.

RESULTS: No significant differences were observed in tibial proximal total BMD and trabecular BMD in H, J, and JH groups compared with the control (C) group. There were significant greater tibial mid shaft cortical area and CSMI in JH group than that in the C and H groups ($p<0.05$). JH group exhibited highest tibial proximal total and trabecular BMD, mid shaft cortical area and CSMI values among the groups.

CONCLUSION: These findings suggest that a combination of jumping exercise and honey supplementation may elicit beneficial effects on tibial BMD and geometry in general compared to jumping exercise or honey supplementation alone in rats.

FP10

In vivo evaluations of wound healing of Tualang honey using a full thickness burn wound in Sprague Dawley rats

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BACKGROUND: The aim of this study is to evaluate the wound healing properties of tualang honey in infected full thickness burn wound in Sprague Dawley rats model.

METHODS: The effect of Tualang honey on wound healing in the full thickness burn wound properties was evaluated in thirty six male Sprague-Dawley rats. The rats were randomly divided into three groups of twelve rats each according to the organism group that was inoculated on the burned wound, Group A (*Pseudomonas aeruginosa),* Group B (*Klebsiella pneumoniae*) and Group C (*Acinetobacter baumanii*). Rats were anesthetized and 3 burn wounds on each rat were created using modified metal screw driver which were heated using flame from Blow torch. Tualang honey was applied on the 1st wound on each rat. As for the controls, the 2nd and 3rd wounds on each rat were dressed with Chitosan gel and Aquacel-Ag® respectively. On days 1, 3, 6, 9, 12, 15 and 18 postburn, the condition of each wound was examined and photographs were taken during each change of dressings. For wound size measurements, all wound were traced on a transparency paper and later was measured in mm scale.

RESULTS: Comparison of the time course of the wound sizes in the three groups showed that the mean wound size in the Tualang honey treated wounds was statistically not significant when compared to the Chitosan gel and Aquacel-Ag® treated wounds ($p > 0.05$).

CONCLUSION: Topical application of Tualang honey on infected burn wound infected with *Pseudomonas aeruginosa, Klebsiella pneumoniae* or *Acinetobacter baumanii* showed no difference in healing rates when compared with other treatments.

FP11

Treatment of burn wounds using Tualang Honey, Hydrofibre and Silver dressings: A pilot study

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BACKGROUND: The objective of this study is to compare the clinical healing properties of partial-thickness burn wounds treated with Tualang honey compared to silver-containing hydrofibre dressing materials.

METHODS: A total of 50 patients were included in this study with their age ranging from 6 months to 63 years, the majority of the patients are in the age group between 1 to 10 years. There were 24 female patients and 26 male patients. Sixty percent of the burn wounds were superficial and superficial dermal while the remaining were all deep dermal burns. Thirty four percent of the patients were treated with aquacel with Tualang honey, 42% with aquacel plain alone and the remaining 24% with aquacel Ag.

RESULTS: The average time for epithelization for wounds treated using Tualang honey was 18 days, in comparison to 21 days for Aquacel Ag and 12 days for aquacel plain. The mean number of dressing changes was 5 for patients treated using aquacel honey, 4 for aquacel plain and 6 for Aquacel Ag. Patients tolerance to pain during dressings were good and equal among the three group of dressing materials. Five percent of wounds treated with Tualang honey showed greenish or yellowish discharge during initial dressings and became clean later on, the remaining of the wound was clean throughout the treatment course. The mean length of hospital stay was 5, 3 and 10 days for Tualang honey, plain aquacel and Aquacel Ag respectively.

CONCLUSION: As a conclusion, the usage of Tualang honey as dressings material for burn patients showed superior result compared to aquacel Ag in relation to the rate of wound healing. The high osmolarity and high-nutrient content accelerate the cleansing and desloughing of dirty wounds and promote epithelization and angiogenesis

FP12

Title: Effect of bee products on setting time of Mineral Trioxide Aggregate cement: A Preliminary study

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BACKGROUND: Lately, Mineral Trioxide Aggregate (MTA) has been used widely in dentistry in repairing perforations, as a root-end filling material and pulp capping material. However, it presents with some disadvantages, such as prolonged setting time and poor handling characteristics. The aim of this research was to study and compare the setting time of MTA when mixed with Manuka honey, Tualang honey and Propolis.

METHODS: A temperature meter was used to measure the setting time. The powder component of the MTA cement was mixed with the specimens on a glass slab. Immediately after mixing the initial temperature of the specimens was measured by bringing in contact with the thermocouple tip of the temperature meter. The temperature of the specimens was monitored with the temperature meter till the temperature of the specimen reached the room temperature. The time difference between the two temperatures was calculated as the setting time. Setting time of MTA mixed with various bee products, was compared.

RESULTS: The cement sample mixed with Manuka honey exhibited the least setting time followed by Tualang honey, whereas propolis cement mix did not set for prolonged periods.

CONCLUSION: Mixing various bee products with MTA had an effect on its setting properties. Manuka honey enhanced the setting time of MTA better than Tualang honey whereas Propolis prolonged it. Further studies on cytotoxicity of MTA mixed with Manuka honey need to be done.

FP13

Volatile compositions of Malaysian Tualang (*Koompasia Excelsa*) honey

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BACKGROUND: The constituents of honey's volatile compounds depend on the nectar source and differ depending on the place or origin. To date, the volatile constituents of Tualang honey have never been examined qualitatively or quantitatively.

OBJECTIVES: The aim of this study was to analyze the volatile compounds in local Malaysian Tualang honey using gas chromatography mass spectrometry (GC-MS).

METHODS: A continuous extraction of Tualang honey using five different organic solvents was carried out following its dilution (1:1) with distilled water. Extraction was first performed with non-polar solvents (petroleum spirit 40:60 and hexane), followed by more polar solvents (dichloromethane, ethyl acetate and methanol). Clear extracts from the five organic solvents were transferred into autosampler vials for GC-MS analysis.

RESULTS; Overall, thirty five volatile compounds were detected. Hydrocarbons constitute more than half (58.5%) of the composition of Tualang honey. Other classes of chemical compounds detected included acids, aldehydes, alcohols, ketones, terpenes, furans and a miscellaneous group. Methanol yielded the highest number of compounds, such as acetic, palmitic and stearic acids as well as 2-furancarboxaldehyde, furfural alcohol and 5-(Hydroxymethyl) furfural (HMF). Several compounds that had not previously been reported in literature were present in Tualang honey, including stearic acids, 2-cyclopentene-1,4,-dione, dihydro-butyrolactone or 2[3H]-furanone, gamma -crotonolactone or 2[5H]-furanone, 2-hydroxy-2-cyclopenten-1-one, 2,4-dihydroxy-2,5-dimethyl-3[2H]-furan-3-one and hyacinthin or phenylethanal.

CONCLUSION: A total of 35 volatile compounds were detected in Tualang honey. This is the first study to elucidate the composition of Malaysian Tualang honey. Further research to test the clinical benefits of these volatile compounds is recommended.

FP14

Egyptian bee honey and propolis extract for first week infantile diarrhoea

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INTRODUCTION: Infantile diarrhoea in the first week of life is not uncommon problem. Antimicrobials are not always effective. Besides, they carry the risk of disturbing the intestinal microflora such early in life

OBJECTIVE: To assess clinical efficacy and safety of Egyptian bee honey and propoils extract (EBH/ EP) for the 1st week infantile diarrhoea.

METHODS: Ninety-seven infants having diarrhoea in the 1st week of life were randomly assigned into two groups: 1) group (49) I received 5 ml of EBH three times daily for 5 day, and, 2) group II (47) received antibiotic therapy. They were compared for: 1) clinical improvement, 2) need for hospitalization, 3) need for fluid therapy, 4) duration of fluid therapy, 5) incidence of complications, 6) adverse effects.

RESULTS: Base-line criteria were alike: average gestation age at birth (38.5; 39.1 weeks for groups I and II respectively), infant weight (3940, 4110 gram, $P > 0.05$), frequency of daily diarrhoeal bouts (7.8, 7.2; $P > 0.05$), incidence of fever (15/49, 13/47; 30.6%; 27.7%; $P > 0.05$). Following treatment, 43 cases of group I and 33 of group II showed normalization of diarrhoeal bouts (70, 87.7%; $P < 0.01$); 11 cases of group I and 6 of group II got normalization of temperature (73, 46%, $P < 0.05$). Thirteen cases of group I and 17 of group II needed hospitalization (26, 37% $P < 0.05$). Twenty-three cases of group I and 29 of group II needed fluid therapy (47, 62%, $P < 0.01$). No serious side effects were noted for group I, while 1 infant in group II developed anaphylactoid reaction, and 1 hypersensitivity skin eruption.

CONCLUSION: EBH/EP may be effective and safe therapeutic approach for 1st week infantile diarrhoea. Further research is needed to confirm results, specify antimicrobial spectrum and settle mechanisms of action.

FP15

Antiproliferative activity of honey on oral squamous cell carcinoma and human osteosarcoma cancer cell lines

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INTRODUCTION**:** Honey exhibits a broad spectrum of therapeutic properties and uses including antibacterial, antifungal, anti-inflammatory and moderate anticancer effects. Honey contains many biologically active compounds such as caffeic acid, caffeic acid phenethyl ester and flavonoid glycones, which was proven to have inhibitory effect on tumor cell proliferation. This study aims to verify the antiproliferative activity of local honey (*Tualang*) on oral squamous cell carcinoma (OSCC) and human osteosarcoma (HOS) cell lines.
METHODS: Several doses of *Tualang* honey (1% - 25%) were applied on the OSCC and HOS cell culture for 3, 6, 12, 24, 48 and 72 hours. Morphological apoptosis characteristics were assessed under light microscopy and with Hoechst stain 33258 under fluorescence microscope. Cell viability assay was performed whereby OSCC and HOS cell lines were seeded in 96-well plates and doses of honey were added. After incubation period, MTT was added and incubated for a further 4 hours at 37°C prior to addition of dimethyl sulfoxide (DMSO). Analysis was done by using Elisa reader at absorbance 570nm. All experiments were performed in triplicates. Detection of early apoptosis was done using ApoAlert® Annexin V-FITC Apoptosis Kit I for flow cytometry. Non-peroxidase honey activity and osmolar solution control was examined in addition to selectivity effect.
RESULTS: Morphological appearance show fragmented and nuclear chromatin condensation with reduction in cell number depending on time and concentration of honey applied. *Tualang* honey showed significant growth inhibitory effect on OSCC and HOS. Cell viability assay showed a dose-dependent inhibitory effect of honey on OSCC and HOS cell lines. The 50% inhibitory concentration (IC50) for both cell lines was 4% and 3% respectively. The maximal inhibition of cell growth of ≥80% was obtained at 15% for both cell lines. Cell viability decreased as the dosage of honey was increased showing growth inhibition effect of honey on both cell lines. Early apoptosis was evident by flow cytometry. This effect was time and concentration-dependent.
CONCLUSION: *Tualang* honey has antiproliferative and apoptotic effect on OSCC and HOS cell lines.

FP16

Propolis attenuates the production of adhesion molecules and microparticles in endothelial cells: A potential agent for prevention of vascular complications

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OBJECTIVES: Adhesion molecules and microparticles are inflammatory mediators shown to be involved in the regulation of inflammatory cascades based upon previous *in vitro* studies. Thus, we aimed to evaluate the effects of Propolis on the production of tumour necrosis factor (TNF)-induced endothelial microparticles and adhesion molecules, namely intercellular adhesion molecules-1 (ICAM-1) and vascular cells adhesion molecules-1 (VCAM-1).
METHODS: Crude extract of propolis originated from New South Wales, Australia were prepared using standard extraction methods. Human brain endothelial cell-lines (HBEC-5i) were cultured to confluence at 37°C with 5% CO2. Cells were pre-incubated with the extracts, at concentrations ranged between 0,1 and 10 ug/mL, prior to stimulation by 10 ng/mL of TNF. Effects of the extracts were measured using flow cytometry after labelling the cells and supernatant with Phycoerythrin-labelled antibodies.
RESULTS: Results were expressed in mean fluorescence intensity and numbers of microparticles produced per 1000 events, for quantification of adhesion molecules and microparticle production, respectively. Our preliminary results show that propolis demonstrated dose-dependent inhibitory effects on the production of ICAM-1 and VCAM-1 as well as endothelial microparticles.
CONCLUSION: Propolis has the ability to inhibit the productions of TNF-induced adhesion molecules and endothelial microparticles, thus may play a major role in the regulation and prevention of vascular-related pathologies. These findings may contribute a vital knowledge towards the development of natural vascular anti-inflammatory agents in the near future, hence warrant us to further explore the molecular mechanism of actions involved.

FP17

A preliminary study on antioxidant activity of selected Iranian honeys

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BACKGROUND: Iran is located in the part of the world where there are different climates, high mountains rich in medicinal herbs where some of the best qualities of honey are manufactured. There are a lot of evidence to indicate that both Apitherapy and honey production have been active in Iran since ancient times. Preliminary studies on the effect of a chosen Iranian honey on male broilers have shown positive nutritional impact on their performance and immune response. Up-to-date, no studies on the antioxidant activity of Iranian honey have been reported. This is the first study to evaluate the selected Iranian honeys and may provide useful data for their potential medicinal uses.
METHODS: The isolation and purification of the bioactive components were carried out using standard procedures. Phenolics were then recovered using a Solid phase extraction (SPE) technique. Determination of the free radical-scavenging activity of honey were made using DPPH assay and the total antioxidant power of honey were measured by FRAP Assay.
RESULTS: Phenolic extracts were successfully carried out. DPPH and FRAP assays showed a range of activities. The results showed that different honey has different antioxidant capacity, due its different floral source.
CONCLUSION: All the extracts of selected Iranian honey showed the presence of phenolics. These phenolic compounds exhibit different anti-oxidant capacities. Further study need to be done to identify these phenolic compounds as they are potentially useful in medicine.

FP18

Sternal wound infections as a post operative complication after open heart surgery: Evaluation of risk factors and role of honey in management

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BACKGROUND: Elderly patients undergoing cardiac surgery have high rates of post operative morbidity and mortality rates. Rate of incidence of deep wound infections after cardiac surgery is 0.4%-5% with a mortality rate of 8%-80%. Management is mainly done through surgical procedures. Usage of honey after surgeries for its antimicrobial, anti-inflammatory & wound healing properties has also been reported.
METHODS: It is a retrospective study conducted by the collection of data from medical records of referred patients treated privately in Karachi with the case of any sternal wound infection occurring as a complication after open heart surgery from the year 2006 to 2007. Patients younger than 50 years of age are excluded from the study. SPSS 12.0 is used for data entry and analysis.
RESULTS: Among the cases included the mean age was 57.2 with ± 4.88. Considered risk factors have shown significant associations with the development of sternal wound infection as 89% patients were known case of diabetes and in all cases internal mammary artery was used as a bypass graft. Time of presentation of sternal infection after cardiac surgery was 4-6 weeks in 65% cases. In 68% of the cases only sternal wire was infected whereas 32% were of osteomyelitis & costochondritis along with infected sternal wires. In the management of wound infections beside conventional surgical and non-surgical treatment we used honey due to its reported anti-microbial and rapid wound healing properties which showed significant results. All the cases were treated successfully & have no other complications up till 3 months follow up.
CONCLUSION: Our series showed that risk factors like diabetes, smoking, reopening procedure & usage of internal mammary artery have significant role in developing sternal wound infections after cardiac surgery. Usage of honey in the treatment plan has shown a significant result.

FP19

Microbiological properties of Tualang honey dressing for treatment of partial thickness burn wound: a comparison with Manuka honey and silver based dressing

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BACKGROUND: The uses of honey as a natural product of *Apis mellifera* for the burns treatment has been widely applied for centuries. Honey is a carbohydrate substance with fructose and glucose as major substances and other chemical compounds present in small quantities. The objective of this study was to determine the microbiological properties of partial thickness burn wounds treated with Tualang honey and to compare it with commonly used Aquacel-Ag and Aquacel-Manuka honey dressings.

METHODS: Ten consented patients with partially thickness burn wound were included in this study. Swabs and tissues obtained from these patients were streaked on blood agar and Mac Conkey agar for bacterial isolation and identification. In order to quantitate the bioburden of the swabs, pour plate was performed to obtain the colony count (CFU/mL).

RESULTS: Seven organisms were isolated from ten patients and tested on Aquacel-Tualang honey, Aquacel-Manuka honey, Aquacel-Ag and Aquacel-Plain to compare the effectiveness of each dressing.

CONCLUSION: The results obtained showed that Tualang honey has good antimicrobial properties although not as good as Manuka honey and Silver-based dressing (Aquacel-Ag).

FP20

A randomized control trial comparing the effects of manuka honey and tualang honey on post debridement diabetic foot wounds

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BACKGROUND: The increased prevalence of diabetes mellitus in Malaysia and profound complication of diabetic foot ulcers have been a huge burden to the patients and the health institutions. A resurgence of interest and 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 Malaysian tualang honey with the well-established manuka honey in the management of patients with diabetic foot wounds

METHODS: 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 daily basis post surgical debridement. Wound healing was assessed by measuring the granulation surface area utilizing tracing technique. The primary outcome measure which was area of coverage with new granulation tissue was checked in each group after seven days.

RESULTS: There was no significant difference (p=0.687) between manuka honey and tualang honey group in term of mean percentage of granulation tissue surface area after one week of dressing in diabetic foot ulcers (manuka group 60.7%, tualang group 57.0%). All variables in both groups which were age, wound size, HbA1c, haemoglobin level, serum albumin level, absolute lymphocyte count and ankle-brachial systolic pressure index (ABSI), were comparable and were not statistically significant to influence the primary outcome.

CONCLUSION: Tualang honey induced granulation and exhibited beneficial action in wound healing which was comparable to the more established manuka honey. The result suggests tualang honey could potentially be used as an alternative therapeutic agent for diabetic foot wounds.

FP21

Identification of three fingerprint patterns in propolis from five geographic regions with TLC, HPLC and LC-MS

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BACKGROUND: Chemical constituents of propolis exerting activities *in vitro* and *in vivo* are complicated and vary according to the climatic and geographical region and to the plants surrounding the bee hive. The increasing application of propolis preparations in medicines requires thorough qualitative and quantitative determination of their chemical profiles.

METHODS: Fingerprinting was carried out on ethanol extracts of propolis from five different geographic regions using TLC, HPLC and LC-MS.

RESULTS: From TLC fluorescence image and LC-MS, three distinct chemical fingerprint patterns were observed. Pattern 1 was characterized by the presence of artepillin C and the absence of CAPE and was represented by Brazilian propolis. Pattern 2 comprised of propolis samples from New Zealand, China and Australia, which was characterized by the presence of CAPE and the absence of artepillin C. Pattern 3 was illustrated by the absence of both CAPE and artepillin C, as shown in Indian propolis. The contents of artepillin C, CAPE, caffeic acid and 6 flavonoids were also determined simultaneously by HPLC. The separation of CAPE from other co-eluted peaks in HPLC has been a difficult task in propolis chemical studies. Here, CAPE was successfully separated from other co-eluted peaks using a Phenomenex Synergy polar- reversed phase C18 column and a mobile phase containing 0.5% acetic acid in methanol: water (60: 40).

CONCLUSION: Three fingerprint patterns have been identified for propolis samples from 5 countries. The characterization of chemical profiles will help explain the variation in the biological activities of propolis from different geographic regions.

FP22

Effect of glibenclamide and tualang honey on free radical scavenging enzymes and lipid peroxidation in streptozotocin-induced diabetic rat pancreas

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BACKGROUND: The pancreatic β-cells are vulnerable to deleterious effect of hyperglycemia. This harmful effect is mediated through oxidative stress. This study investigated the effect of tualang honey, glibenclamide or glibenclamide in combination with tualang honey on free radical scavenging enzymes and lipid peroxidation in streptozotocin (STZ)-induced diabetic rat pancreas.

METHODS: Diabetes was induced in male Sprague Dawley rats (250 - 300g) by STZ (60 mg/kg; ip). Rats were randomized into six groups. The first two groups which consisted of healthy rats received distilled water (0.5ml/day) and tualang honey (1.0g/kg/day). The remaining four groups comprised diabetic rats and were administered distilled water (0.5ml/day), tualang honey (1.0g/kg/day), glibenclamide (0.6mg/kg/day) or a combination of tualang honey (1.0g/kg/day) and glibenclamide (0.6mg/kg/day). The animals were treated for four weeks.

RESULTS: The pancreas of diabetic control rats showed elevated levels of malondialdehyde (MDA) and increased activities of superoxide dismutase (SOD) and glutathione peroxidase (GPx). Catalase (CAT) activity was significantly reduced with no significant change in the activities of glutathione reductase (GR) and glutathione-S-transferase (GST) in the pancreas of diabetic rats. Glibenclamide did not produce any significant effect on SOD, GPx and CAT while MDA levels remained elevated. On the contrary, treatment with tualang honey significantly increased CAT activity and down-regulated SOD activity. It also decreased MDA levels with no effect on GPx activity. However, the diabetic rats that received a combination of glibenclamide and tualang honey showed a significant increase in CAT activity while GPx activity and MDA levels were significantly reduced.

CONCLUSION: These results suggest that glibenclamide does not ameliorate oxidative stress in the diabetic rat pancreas. In contrast, tualang honey alone or a combination of glibenclamide and tualang honey ameliorates pancreatic oxidative stress. Hence, the antioxidative effects produced by glibenclamide in combination with tualang honey could be ascribed to tualang honey.

FP23

Comparison between Tualang honey dressings and silver impregnated hydrofiber dressing in full-thickness wound in rat model

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BACKGROUND: Tualang honey obtained from wild rainforest giant Asian bee has been traditionally used to treat wound, however there is no scientific evidence. The objective of this study was to assess the efficacy of Tualang honey in promoting wound healing, and inflammatory responses in an animal study model.
METHODS: A full-thickness wound was created on the dorsum of 45 Sprague-Dawley rats. Tualang honey impregnated paraffin tulle and hydrofiber dressings were used in comparison to silver containing hydrofiber dressing. The wounds were inspected on day 4, 7, 14, 21 and 28. The dressings and wound were assessed for adherence, ease of removal, fluid accumulation, dryness of skin and exudates, rate of epithelization, healing and wound contraction. Three rats from each arm were sacrificed on the day wounds were inspected and the wound/scars were analyzed histologically for the inflammatory parameters.
RESULTS; Tualang honey impregnated dressings were comparable to the commercially available modern dressing-the silver impregnated hydrofiber dressing in term of adherence, ease of removal, fluid accumulation, dryness of surrounding skin and exudates. Subsequence histological analysis of inflammatory reaction inflicted by each dressing were also comparable with no significant different statistically. The rates of wound healing and wound contracture were not significantly different between the study arms.
CONCLUSION: Tualang honey impregnated dressings are as effective in term of dressing property and promoter of wound healing when compared to well establish commercially available modern dressing.

FP24

Effects of Malaysian tualang honey supplementation on glycemia, antioxidant enzymes and markers of oxidative stress in kidneys of normal and streptozotocin-induced diabetic rats

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BACKGROUND: Oxidative stress is implicated in the pathogenesis and/or complications of chronic diseases such as hypertension and diabetes mellitus. In diabetes, hyperglycemia increases generation of free radicals resulting in oxidative stress which further aggravates diabetic complications. This study investigated the effects of honey supplementation on hyperglycaemia, antioxidant enzymes, oxidative stress parameters and histology of kidneys in normal and streptozotocin (STZ)-induced diabetic rats.
METHODS: Diabetes was induced in male Sprague Dawley rats (10-12 weeks) by STZ (60mg/kg; ip). Rats were randomly divided into 4 groups. The animals were treated orally for four weeks as follows: normal rats given 0.5 ml of distilled water (group 1), normal rats received 1.0 g/kg of honey (group 2), diabetic rats given 0.5 ml of distilled water (group 3), diabetic rats treated with 1.0 g/kg of honey (group 4).
RESULTS**:** Fasting plasma glucose (FPG) and renal malondialdehyde (MDA) were significantly elevated in diabetic rats. Activities of superoxide dismutase (SOD) and glutathione peroxidase (GPx) were significantly up-regulated in diabetic kidneys. Body weight (BW), catalase (CAT) activity, total antioxidant status (TAS), total glutathione (TGSH), reduced glutathione (GSH) and reduced glutathione (GSH): oxidized glutathione (GSSG) ratio were significantly reduced in diabetic kidneys. Honey significantly increased BW, CAT activity, TAS, TGSH, GSH and GSH: GSSG in diabetic rats. Honey significantly reduced FPG, MDA levels, activities of SOD and GPx in diabetic rats. Histopathological examination showed that honey-treated diabetic kidneys had reduced mesangial matrix expansion and thickening of glomerular basement membrane. No significant effects of honey on FPG and renal oxidative stress parameters in normal rats were observed.
CONCLUSION: These results indicate that honey reduces hyperglycemia, ameliorates oxidative stress and protects against STZ-induced diabetic renal damage. These findings suggest that therapeutic interventions aimed at reducing hyperglycemia and preventing oxidative stress may be beneficial in the management of diabetic nephropathy.

FP25

Antimicrobial activities of three types of honey towards selected pathogenic and non-pathogenic microorganisms

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BACKGROUND: The emergence of strains of pathogenic microorganisms with resistance to commonly used antibiotics has necessitated a search for novel types of antimicrobial agents. It is of a great importance to understand the efficiency of honey against microorganisms. The main objective of this study was to investigate the biological activities of Black Seed (*Nigella sativa*) honey, Floral Turkish honey and Manuka honey against eight pathogenic bacteria and four pathogenic fungi.

METHODS: Agar diffusion, Minimum Inhibitory Concentration and Minimum Killing Concentration methods were used to evaluate the anti-microbial activity.

RESULTS: All the Gram-positive and Gram-negative bacteria tested were found to be inhibited to some extent by the three different honeys, although the antimicrobial potency was highly dependent upon type of honey and test organism. The honey samples were especially active against methicillin-resistance *Staphylococcus aureus* NCTC 8329, *Escherichia coli* NCTC 5933 and the yeast *Candida albicans NCTC* 10718. *Enterobacter aerogenes* DMU 52 was found to be particularly sensitive to Floral Turkish honey.

CONCLUSIONS: The honey samples studied proved to be a good source of antimicrobial agents that might serve to fight against several diseases.

FP26

The most important medicinal uses of Honey, and its side effects in the book of the Canon by Avicenna, and in the modern medical literature: A comparative study

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INTRODUCTION: Honey is considered an important food and drug in Persian Traditional Medicine, either singularly, or as an ingredient in compound drugs. One of the most creditable ancient texts about the prophylactic and therapeutic uses of honey is "The Canon of Medicine" by Avicenna (981-1037 A.D), the most famous physician of ancient Persia. He's used the word "asal"(=Honey) more than 1400 times in the Canon, and mentioned several external and internal therapeutic uses of honey in the diseases of circulatory, hearing and visual systems, cos-metics, superficial wounds and infected deep injuries, eczema, inflammations and infections of tonsils and throat, and some disturbances of digestive system. He also mentions some side effects of honey.

OBJECTIVES: To find out the most important therapeutic uses, and side effects of honey in the Canon of Medicine, and comparing them with modern medical findings.

METHODS: In this review article, we firstly referred to the book of the Canon; book II, the monograph on honey, also available at: http://ddc.aub.edu.lb/projects/saab/avicenna/640/html/S1_233.html

and translated it to English, then searched in Pubmed database and Google to reach the modern findings supporting the Avicenna's writings about honey. Among 42 related articles, 6 ones were selected for instance, and used to refer to.

RESULTS: Some of the actions of honey described in the Canon are scientifically approvable, including its effects on pussy wounds, superficial infections, inflammations and infections of the tonsils, throat and larynx, and eczema. Some other effects and side effects of honey haven't been scientifically studied yet.

CONCLUSION: This study shows the compatibility between some ancient descriptions of honey by Avicenna and the modern findings; so there is no reason to neglect the effects which hasn't been studied yet. It's recommendable to start new researches on the hidden aspects of honey -therapy according to the Canon of Avicenna.

FP27

Intravaginal Egyptian propolis extract for infertility due to seminal hyperviscosity

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INTRODUCTION: Though seminal hyperviscosity is not a common reason for infertility, yet, it is a difficult therapeutic dilemma. Propolis was found to have "anti-viscosity properties" both in vitro and in vivo. Also, it imposes anti-inflammatory and antimicrobial actions and protective antioxidant effect for spermatozoa and other cells.

OBJECTIVE: We aimed to test the therapeutic value of using propolis vaginal application for infertility associated with excessive seminal viscosity.

METHODS: Case control study involving 80 couples with infertility and semen hyperviscosity. Men were evaluated by semen analysis for sperm parameters, semen viscosity and evidence of infection and by transrectal ultrasonography for the condition of the seminal vesicle. The women of the study group used mid-cyclic (day 7 to day 17) intravaginal douching with Egyptian bee propolis extract, around the time of coitus, for at least three successive months. The main outcome evaluated was the occurrence of pregnancy.

RESULTS: There were 14 pregnancies amongst the propolis group over a total of 137 cycles; pregnancy rate per cycle being 10.2% and 3 pregnancies in 107 cycles in the controls. The difference is of statistical meaning ($P<0.05$). Ultrasonographic features of seminal vesiculitis and evidence of Trichomonas vaginalis infection were relatively common associations. There were no side effects.

CONCLUSION: Infertility related to increased seminal viscosity may be treated safely and with considerable efficacy by the midcyclic pericoital intravaginal douching with Egyptian propolis extract.

FP28

Determination of 5-hydroxymethylfurfural content in ten Malaysian honeys

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BACKGROUND: 5-hydroxymethylfurfural (HMF) content is an indication of the quality of honey. It is postulated that high concentrations of HMF in honey is indicative of overheating, poor storage conditions and old honey. Both the Codex Alimentarius Commission and the European Union recommended its concentration to be 80 or 40 mg/kg, respectively. The aim of this study is to analyze the HMF content in 10 honey samples collected from different parts of Malaysia.

METHODS: The International Honey Commission recommends three methods for the determination of HMF: (i) White spectrophotometric methods (ii) Winkler spectrophotometric methods and (iii) HPLC method. In this study, all three methods have been used and the content of HMF in the honey samples determined by the three methods was compared.

RESULTS: HPLC and White spectrophotometric results gave similar values, whereas Winkler method showed higher readings than the other two methods. The HMF content of the freshly collected 7 honey samples (stored for 3-6 months) ranged from 2.80 to 24.87 mg/kg while the HMF content of 4 other honey samples (stored for 12-24 months) were ranged between 118.47 and 1139.95 mg/kg.

CONCLUSION: The HMF content of fresh Malaysian honey samples (2.80-24.87 mg/kg) were within the internationally recommended value but the honey of 12 to 24 months storage duration have much higher HMF content (118.47-1139.95 mg/kg). It is concluded that HMF content increases with the storage time.

FP29

Indian honey as a medicine

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BACKGROUND: Honey is the first sweetening agent known to man. Since ancient times, its use as a traditional medicine includes remedy for gastric and intestinal disorders, for all kinds of inflammation, antiseptic use on various wounds and skin diseases, antiseptic gargles and expectorants to maintain mouth hygiene. Hence, the studies were planned to check Jambhul honey's *in vitro* antimicrobial activity on various clinical isolates and its *in vivo* effectiveness on various clinical conditions such as various types of wounds, sore throat and acne.

METHODS: In the present study, Jambhul honey which is known to have best antimicrobial activity was used to study *in vitro* antimicrobial activity by Agar dilution method on total 600 clinical isolates of different bacterial species. *In vivo* effect of the same honey was tested on patients with wounds (142), sore throat (35) and acne (30). In wound patients, sterile honey was used for wound dressing daily. In sore throat patients, honey gargle was advised minimum three times a day and subsequent changes were recorded after every two days. In acne patients, honey application was advised every night and changes were recorded weekly. In all clinical conditions, *in vitro* culture study was also carried out simultaneously. The antibacterial activity of honey was observed more or less similar on sensitive, non MDR and MDR strains of all clinical isolates studied.

RESULTS: In all wound patients, remarkable healing was observed within 4-5 dressings which were found to be faster than that of conventional dressings. Honey dressings were found to be more comfortable and less painful on removal. In sore throat patients, gradual symptomatic recovery was observed in all patients and complete recovery in 70% patients was observed in 3-5 days. Symptomatic recovery was well correlated with clinical and cultural findings. In acne patients, 50% patients revealed *Staphylococcus aureus* on culture study. Considerable reduction in pigmentation and inflammation was observed within 1-2 weeks in all patients. In 80% recovered patients, no relapse was reported till 6 months duration whereas in 20% patients relapse of acne was reported after 1 month duration.

CONCLUSION: Promising *in vitro* antibacterial activity of Jambhul honey on different clinical isolates and its *in vivo* effectiveness on various clinical conditions can thus confirm its place in medicine.

Poster Presentation

P01

Egyptian bee honey, propolis and royal jelly for the prevention of premature labour and premature rupture of the fetal membranes

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INTRODUCTION: Premature labor (PL), especially when associated with premature rupture of the fetal membranes (PROM), is a difficult clinical problem. There is a need for a simple and effective preventive approach.

OBJECTIVE: The study aimed at evaluating the therapeutic value of Egyptian bee honey, propolis and royal jelly as prophylaxis against PL/PROM.

METHODS: Fifty nine pregnant ladies with history of recurrent PL/PROM were recruited. They were randomly assigned into 2 groups: group I (30 women) received 20 mL of Egyptian cotton-trifolium bee honey, 400 mg Egyptian propolis and 2 grams of royal jelly, daily, from the 10th week of pregnancy till the onset of labour or the completion of 38 weeks' gestation age; and group II (29 women) served as controls. Primary outcomes assessed were: 1) gestation age at birth, and, 2) incidence of PL/PROM. Secondary outcomes were: 1) ultrasonic evidence of cervical changes of threatening PL, 2) total leucocytic count, and, 3) C-reactive protein.

RESULTS: Twenty pregnancies of group I went to term as compared to 13 of controls (66.7%, 44.8%; $P < 0.01$). Average gestation weeks at birth were 36.3 and 31.1 ($P <0.01\%$). Cervical ultrasonographic signs of PL threat were elicited in 11 and 19 cases of groups I and II respectively (36.7 and 65.5%; $P <0.01$). High leucocytic counts and C-reactive protein were found in 10 and 15 women of the cases and controls respectively (33.3 and 51.7%; $P < 0.05$).

CONCLUSION: Egyptian bee honey, propolis and royal jelly may be effective for reducing the risk of PL/PROM. Reducing the incidence of infection and prevention of uterine cervix dystrophy might be the probable mechanisms behind the therapeutic effect.

P02

Detection and identification of new potential probiotic bacteria from honey of the Giant Honeybee *Apis dorsata* in Highland of Malaysia

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BACKGROUND: Probiotics are dietary supplements of live microorganisms that improve the microbial balance in their host's gut. The giant honeybee (*Apis dorsata*) is a honey bee native to the rainforest of Malaysia and it is endowed with an estimated 40,000 species of vascular plant and thereby offers tremendous potentials to prospect for probiotics. The aim of this study was to isolate, detect and identify probiotic bacteria from honey of the giant honeybee *A. dorsata* in highland of Malaysia.

METHODS**:** Samples of honey were collected from *A. dorsata* colonies from different bee trees in Pedu Lake Kedah Malaysia and were placed in sterile tubes containing physiologic saline and kept at -20oC. *Lactobacillus* bacteria were isolated from honey using selective MRS Agar media. The isolates were Gram-stained and tested for Catalase reaction. The 16S rRNA genes from the extracted DNA of bacterial colonies were amplified with PCR using lactobacilli primers. All bacterial 16S rRNA genes were sequenced and entrusted in GenBank using the accession numbers.

RESULTS: The results showed that the several strains of new potential probiotic bacteria such as; *Lactobacillus Kunkeei* strain Taj Mardan-1, *L*. sp. strain Taj Yazid-1*, L*. sp. strain Mardan Mustafa-1*, L*. sp. strain Yazid Arash-1, *L*. sp. strain Shuhaimi Arash-1, were identified from honey in different colonies of *A. dorsata* in rainforest of Malaysia.

CONCLUSION: High population of *Lactobacillus* bacteria were found in honey samples which were obtained from *A. dorsata* in highland of Malaysia. In future, assessment of their probiotic properties of would be evaluated. Furthermore, our findings introduce some new *lactobacillus* strains of bacteria with high potential probiotic which help to microbial balance of human gastrointestinal.

P03

Studies on effects of Tualang honey Agromas®, Malaysia on female reproductive organs, tibia bone and hormonal profile in ovariectomised rats

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BACKGROUND: Honey is a highly nutritional natural product that has been widely used in the folk medicine for a number of therapeutic purposes. Tualang honey is a wild Malaysian honey. We evaluated whether Tualang honey was effective in reducing menopausal syndrome in female ovariectomised rats.

METHODS: The sham-operated control group (SH) and ovariectomised control group (OVX) received the vehicle treatment (0.5 ml of distill water). The remaining ovariectomised rats were received Tualang honey at three different doses as follows: 0.2 g/kg (THL group), 1.0 g/kg (THM group) and 2.0 g/kg of Tualang honey (THH group). 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 uterine endometrium and vaginal epithelium, increased the trabecular thickness of tibia bones and reduced body weight compared to control OVX group. No atheroma formation at the endothelial wall of aorta in all groups. However, there was no significant change in hormonal profile of the study rats except for free testosterone levels for those rats in THL group.

CONCLUSION: Tualang honey was shown to have beneficial effects on ovariectomised rats by preventing uterine and vaginal atrophy, increased bone density and suppression of increased body weight. It has no significant effect on hormonal level of these rats.

P04

Effects of combined jumping exercise and honey supplementation on tibia and femur bone physical and mechanical properties in rats

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INTRODUCTION: Physical activities and nutritional factors play vital roles in prevention of osteoporosis. However, little is known about the combination effects of exercise and honey on bone.

OBJECTIVE: This study was carried out to investigate the effects of combined jumping exercise as a high impact exercise and honey supplementation on tibia and femur bone physical and mechanical properties in rats.

METHODS: Forty eight 12-week old Sprague Dawley female rats were divided into four groups: control group (8C), honey group (8H), jumping group (8J), and combined jumping and honey group (8JH). Jumping exercise consisted of 40 Jumps/day for 5 days/week at a height of 40 cm. Honey was given to the rats at a dosage of 1g/kg body weight/rat/day via force feeding for 7 days/week.

RESULTS: After 8 weeks of experimental period, right hind leg tibial wet and fat free dry weights, tibial and femoral maximal load (strength), tibial mid-shaft minimum diameter and femoral mid-shaft maximum diameter were significantly ($p<0.05$) increased in combined jumping exercise and honey supplementation group. However, these improvements in bone could not be observed with jumping exercise or honey supplementation alone.

CONCLUSION: The results of the present study suggested that a combination of jumping exercise and honey supplementation elicited discernable beneficial effects on tibia and femur bone generally when compared to jumping exercise or honey supplementation alone in young female rats.

P05

Honey to treat bovine mastitis

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BACKGROUND: The objective of this study was to evaluate the efficacy of intramammary honey administered during lactating period, to eliminate *Staphylococcus aureus* and *Pseudomonas aeruginosa* infection.

METHODS: Bacteriological Procedures: Teats were aseptically prepared before collection of all samples according to National Mastitis Council sample collection and handling guidelines (NMC, 1999). Two types of media were used: Chapman agar and King A agar. The media incorporation technique was used. Plates were incubated at 37°C and examined for bacterial growth after 24 hours. Treatment protocol**:** Infected mammary quarters of three cows were treated once daily with 5 ml of multifloral honey per quarter for 2 consecutive days. Milk samples were taken from affected quarters immediately prior to treatment on d 0, 7, 14, 21, 52 and 60 for microbiological examination. A bacteriological cure was defined as a treated infected mammary quarter that was bacteriologically negative for the presence of previously identified bacteria at 7, 14, 21, 52 and 60 d after the last treatment.

RESULTS; The cure following administraton of honey was 66% (2/3 cows) at days 7 and 14; 100% (3/3) at days 21, 52 and 60 for *Staphylococcus aureus* infection and 66% (2/3) at days 21, 52 and 60 for *Pseudomonas aeruginosa*

CONCLUSION; This preliminary study has shown the efficacy of honey as natural therapeutic product against *S. aureus* and *P. aeruginosa* sub clinical *mastitis*. Further study may elucidate the suseptibility of other pathogens microorganisms implicated in acute clinical and subclinical bovine mastitis (number of cases, herd size), the dynamic of honey (distribution, diffusion) in mammary gland and appropriate intramammary formulation of honey for mastitis prevention and therapy in cows. Finally, honey could be an alternative for mastitis treatment in both conventional and organic farms. This will lead to a huge Economic and Health benefit worldwide.

P06

Tualang honey synergizes with tamoxifen to induce cell death in MCF-7 cells

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BACKGROUND: Tamoxifen (TAM) is an anti-estrogen drug for breast cancer therapy. However, the toxicity of TAM and resistance of cancer cells to TAM limits its clinical application. Hence new compounds are continuously being sought, either to replace or to be used in combination with drugs such as TAM. We have previously shown that Tualang honey induced cell death in various cancer (including breast) cell lines. However, the mechanism of cell death induced by Tualang honey is yet to be determined. The aim of this study is to investigate the effect of Tualang honey and its combination with TAM on breast cancer cell death mechanisms

METHODS: MCF-7 breast cancer cell line was maintained in RPMI-1640 medium supplemented with 10% fetal bovine serum at 37°C with 5% CO2. Cells were treated with either the EC50 dose of Tualang honey alone, in combination with various concentrations of TAM or TAM alone for up to 72 hours. Apoptotic activity was detected using Annexin V-antibody and analysed by flow cytometry. Cells were also stained with FAM-VAD-FMK FLICA reagents for detection of caspase 3/7, 8 and 9 and analyzed using fluorescence microscopy.

RESULTS: Cells treated with Tualang honey alone caused significant induction of apoptosis as compared to untreated cells (control) ($p<0.05$). Combination of Tualang honey and TAM (>10 μM) resulted in synergistic effect on apoptosis of MCF-7 cells as compared to Tualang honey alone ($p<0.05$). Interestingly, the combination of *Tualang* honey and TAM even at a low concentration (2.5 μM) showed significant induction of apoptotic activity compared to TAM alone ($p<0.05$). *Tualang* honey alone or its combination with TAM also caused caspase 3/7, 8 and 9 activation in MCF-7 cells.

CONCLUSION: Tualang honey alone (or when combined with TAM) was able to induce apoptosis via caspase activation indicating the potential of Tualang honey to be used in combination with TAM as a chemotherapeutic agent against breast cancer.

P07

The effect of honey on airway inflammation of cigarette smoke exposed rats

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BACKGROUND: Cigarette smoking is the major risk factor for chronic obstructive pulmonary disease (COPD). Airway inflammation is the central to the pathogenesis of COPD resulting in progressive airflow limitation. The aim of this study was to evaluate the effect of honey on the inflammatory process of the airway.

METHODS: Eighteen male rats aged eight to nine weeks old were randomly divided into two groups. One group was exposed to cigarette smoke alone using smoking apparatus. The other group was exposed to cigarette smoke and given oral honey at 1.2 gm/kg body weight daily. The rats were sacrificed after four weeks of exposure and the lung tissues were processed accordingly. The immunohistochemical staining was performed using mouse monoclonal antibody CD68 and alveolar macrophages were calculated with image analyzer.

RESULTS: There was a significant reduction in the number of alveolar macrophage in the group exposed to cigarette smoke plus honey compared to cigarette smoke exposure alone (z = -2.519, p= 0.012).

CONCLUSION: Honey has a beneficial effect in reducing the macrophage recruitment in airways following inflammatory response due to cigarette smoke inhalations. Further research is warranted to study the anti-inflammatory mechanism of honey and effects of honey following established airway inflammation in COPD patients.

P08

Use of honey as antifungal agent against yeast infections

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BACKGROUND: In Malaysia, there are few types of alternative medicine such as honey. Recent experimental finding indicated that the amylase present in honey increases the osmotic effect in the media by increasing the amount of sugars and consequently increasing the antifungal activity. Yeast such as *Candida* sp. is a most common cause of candidiasis, an acute, subacute, or chronic infection involving any part of the body. This organism is also isolated from skin, normal mouth and vaginal mucous membranes, and normal stools. Due to the medicinal properties of honey, it was tested onto these fungi.

METHODS: The antifungal activity of the honey was tested against *Candida crusei, C. lutsinea, C. albicans, C. parapsilosis* and *Cryptococcus neoformans* using the well diffusion method. One hundred microliters of honey was loaded into wells (8 mm in diameter) on Sobauraud Dextrose Agar plates. One hundred microliters of sterile distilled water was used as control. Antifungal activity was determined by assigning a range of activity observed that resulted from the arbitrary estimation of the size (diameter) of the inhibition zone.

RESULTS: After two days incubation, honey gives retardation to the growth of *C. parapsilosis* and *C. albicans*.

CONCLUSION: Honey is effective against *C. parapsilosis* and *C. albicans*. Future study is needed to further evaluate the usefulness of these substances as potential antifungal agents.

P09

Cytotoxicity of Tualang honey on normal and keloid human dermal fibroblasts

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INTRODUCTION: Keloids are a formation of scars beyond the boundaries of injury, burns, surgical incision or disease. It is a result of natural healing process. Recently, several treatments to reduce visibility of the keloids were known. In this study, the use of Tualang honey and its toxicity to skin cells were investigated.

OBJECTIVE: To determine cytotoxicity effect of Tualang honey on normal and keloid skin fibroblasts.

METHODS: The skin biopsy was obtained from consented patients at HUSM. Sample was divided into two groups which were normal fibroblasts and keloid fibroblasts. The sample was cultured and allowed up to 70% confluence before treated with different concentrations of Tualang honey. The treatment was then incubated for 24, 48, and 72 hours. After that, the cytotoxicity effect of Tualang honey on fibroblasts was determined by LDH (Lactate Dehydrogenase) assay.

RESULTS: Tualang honey treated normal and keloid fibroblasts showed different toxicity effect at different concentrations of Tualang honey. At higher concentration, fibroblasts cell were toxic towards Tualang honey. In contrast, fibroblasts proliferation increased at lower concentration of Tualang honey and this contributed to less toxicity. In addition, reduction of fibroblasts proliferation was shown over 24, 48 and 72 hours post treatment.

CONCLUSION: The effects of Tualang honey to fibroblasts proliferation were concentration dependent and time dependent. The use of Tualang honey towards fibroblasts has shown its potential effect in order to treat scarring. Low toxicity of Tualang honey on fibroblasts showed its valuable effect in the treatment of keloid. Thus, Tualang honey has an ability to reduce or minimize scarring.

P10

Characterization of major sugars in honey as purity indicator

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BACKGROUND: The aim of this study is to characterize the major sugars in pure Malaysian honey. The percentages of fructose, glucose, sucrose and maltose are taken as standard indicators to verify other honeys in the market. Major sugars of selected imported honeys are also measured for comparative purposes. Capillary Gas-chromatographic technique is used as it is rapid and reproducible.

METHOD: Pure honeys (4 samples) were obtained from beekeepers in Terengganu, Kedah and Department of Agriculture, Parit Botak, Johor. 61 honey samples were bought from various places in Malaysia or obtained from local supplier. 9 of them were imported honeys. 5 mg of each sample (1 mg for sugar standard) were dissolved in 0.45 mL of pyridine, incubated at 70°C for 10 minutes followed by addition of 0.5 mL of hexamethyldisalizane and 0.05 ml of trifluoroacetic acid. 1.0 µL of the homogenous clear solution was then injected into the gas chromatography column. Following that was chromatogram analysis to determine the sugar percentage in the honey samples tested.

Comparison of sugar profile between the known pure honey samples and unknown honey samples was also done.

RESULTS: 17 of honey samples were identified as pure, 13 adulterated and 31 were synthetic honey. Identification for types of honey was based on criteria such as fructose/glucose ratio, total reducing sugar, percentage of sucrose in the honey sample and chromatogram peak pattern analysis. Imported honeys have different sugar profile compared to the Malaysian honeys.

CONCLUSION: It is possible to differentiate pure honey from adulterated and synthetic honeys based on their major sugar profiles. Only 14.75% of the honeys tested in this study showed characteristics of pure Malaysian honey. Others were either adulterated or synthetic honeys.

P11

The efficacy of *Apis mellifera* venom towards inflammation on rat's paw and its effects on selected internal organs: A preliminary histological analysis

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BACKGROUND: *Apis mellifera* bees are imported from Australia and have been successfully bred in Malaysia. They produce venom which contains more than 40 active components such as melittin and histamine. These components are believed to cause the venom to function as a potential natural anti inflammatory agent. This preliminary study focused on the histological aspect of the effect of *A.mellifera*'s venom towards the inflammation induced by carrageenan injected to the paw of male *Sprague Dawley* rats. The possible side effects of the venom towards the heart, liver, and lung tissues were also histologically looked at.

METHODS: Experimental animals were divided into three groups and each was given two injections at the interval of one hour. First injection was done at right plantar surface followed by a second injection at subplantar surface. Both injections for the first group (modelling healthy group) were 0.9% saline. Second group (modelling diseased group) was injected with 0.9% saline followed by 1% carrageenan. Third group (modelling diseased group with a prior anti-inflammation treatment) was injected with *A.mellifera's* venom with a concentration of 0.1mg/kg body weight and followed by 1% carrageenan. Histological works using Hematoxylin and Eosin (H&E) staining technique were conducted on the tissues of each group 24 hours after the last injection. Processed tissues were analyzed under light microscope and Image Analyzer software.

RESULTS: In this study, changes were observed on the histological features of rat paw and liver tissues in the group which received injection of *A. mellifera*'s venom and carrageenan. The protocol used showed that bee venom as an anti inflammatory agent did not cause side effects on heart and lung tissues.

CONCLUSION: Further studies with more refined venom doses need to be done to verify the effectiveness of bee venom as an anti inflammatory agent.

P12

Sequence of wound healing process in honey treated wound: A preliminary study

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BACKGROUND: Wound healing is a complex process involving three overlapping phases. Inflammatory phase (IP) is the initial stage of wound healing. It is followed by proliferation phase (PP) and finally remodelling phase (RP) that leads to recovery and restoration of skin tissue. Honey as a facilitator of wound healing has become the focus of studies in wound research. Although numerous studies involving honey have been carried out on this topic, the mechanism of its action, e.g. its involvement in the three healing phases, is not fully established.

METHODS: This preliminary study used Gelam honey (local Malaysian honey) on full thickness incisions on male *Sprague Dawley* rats. Two full incisions of the length of 1cm were created on the back of each rat. The incisions were then treated by topical application of honey (treatment) and 0.9% saline (control). These animals were sacrificed accordingly on selected days. The sequence of wound healing process was observed and analyzed histologically. Hematoxylin and Eosin (H&E) staining was used and visualisation was carried out by light microscope and photomicrographs were taken using Olympus Life Science Soft Imaging System.

RESULT: This study showed that honey treatment accelerated the three phases of wound healing and thus shortened the wound healing period. Overall, 10 days were needed in honey treated wound to reach RP, while 14 days were needed by the control wound. Specific phases were shortened by honey treatment, e.g. IP was over before day 4 post-injury, but it was still in existence in the control wound. The process of angiogenesis was best observed in PP. More blood vessels were seen in the wound closure area of honey treated wound on day 6 of post injury as compared to the control.

CONCLUSION: Further study need to be done to prove the efficacy and mechanism of Gelam honey in wound treatment.

P13

Antibacterial effect of Lubuk Buntar honey and Manuka honey against *Salmonella typhimurium* and *Escherichia coli*

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BACKGROUND: Honey has variety of uses in alternative medicine. However, chemical composition and osmolarity of each honey are different based on their nectar sources. The objective is this study is to compare the antibacterial activity of Manuka honey with Lubuk Buntar honey against *Salmonella typhimurium* and *Escherichia coli* at concentrations of 100, 75, 50 and 25%.

METHODS: Disc diffusion method was used by measuring the diameter of inhibition zone produced around the disc. Ciprofloxacin was used as positive control and distilled water as negative control.

RESULTS: Manuka honey showed antimicrobial activity towards *Salmonella typhimurium* with higher inhibition zone (35.0 - 48.0 mm), compared to Lubuk Buntar honey (29.3 – 46.0 mm). Manuka honey also showed antimicrobial activity towards *Escherichia coli* with higher inhibition zone (19.0 – 43.7 mm), compared to Lubuk Buntar honey (14.3 – 36.7 mm). Manuka honey and Lubuk Buntar honey with concentration of 100% produced the best antibacterial activity when compared to dilute one (75, 50 and 25%) and showed higher inhibition zone towards *Salmonella typhimurium* and *Escherichia coli* compared to Ciprofloxacin.

CONCLUSION: Manuka honey showed higher antibacterial effects against *Salmonella typhimurium* and *Escherichia coli* when compared to Lubuk Buntar honey. This might be due to antibacterial substances in its plant derivates.

P14

A preliminary study: Role of Tualang honey on pregnancy outcome in rats subjected to maternal stress

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BACKGROUND: The aim of this study was to collect the preliminary data on the effect of maternal stress on pregnancy outcome and the possible role of Tualang honey to reverse the detrimental effect of maternal stress on pregnancy outcome.

METHODS: Pregnant Sprague Dawley rats were divided into four groups (n=3 per group); control, honey, stress and stress plus honey treated groups. The pregnant rats were subjected to stress by repeated restraining three times per day from day 11 of pregnancy until delivery. Tualang honey (1.2 g/kg body weight/day) was administered orally by gavage to the pregnant rats. Following delivery, the pregnancy outcome such as duration of pregnancy, number of pups, birth weight and gross congenital abnormality of the pups were assessed.

RESULTS: There was no significant difference in term of the duration of pregnancy, number of pups and birth weight when compared between groups. Nevertheless, the number of pups delivered by dams from stress group showed a reducing trend when compared to control, honey and stress plus honey treated groups.

CONCLUSION: Maternal stress by repeated restraining showed three times per day demonstrated a reducing trend in the number of pups and honey supplementation may be able to reverse the detrimental effect.

P15

Effects of combined metformin and honey supplementation on oxidative stress in kidneys of streptozotocin-induced diabetic rats

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BACKGROUND: Studies have shown that optimal glycemic control does not necessarily improve accompanying oxidative stress which plays a vital role in the pathogenesis of diabetic complications. This study investigated the effect of metformin, honey or a combination of metformin and honey on antioxidant enzymes and oxidative stress markers in kidneys of streptozotocin (STZ)-induced diabetic rats.

METHODS: Diabetes was induced by STZ (60 mg/kg; ip). The diabetic rats were randomly divided into four groups. Diabetic rats received distilled water (0.5 mL/day), honey (1.0 g/kg/day), metformin (100 mg/kg/day) or a combination of metformin (100 mg/kg/day) and honey (1.0 g/kg/day). Another group of non-diabetic rats was administered distilled water (0.5 mL). Similarly, honey (1.0 g/kg/day) was administered to a group of normal/non-diabetic rats. Each group consisted of six animals. The animals were treated by oral gavage for 28 days.

RESULTS: Fasting plasma glucose (FPG), lipid peroxidation (MDA), superoxide dismutase (SOD) and glutathione peroxidase (GPx) activities were significantly elevated while total antioxidant status (TAS), reduced glutathione (GSH), activities of catalase (CAT) and glutathione reductase (GR) were significantly reduced in diabetic rats. Honey significantly increased GSH, TAS, activities of CAT and GR in diabetic rats while FPG, MDA levels and SOD activity were decreased. Although metformin decreased FPG and MDA levels, it did not have significant effects on CAT, GPx and GR except SOD. However, metformin in combination with honey significantly increased TAS, activities of CAT and GR while FPG, MDA levels and SOD activity were significantly decreased.

CONCLUSION: Honey exerts hypoglycemic effect and ameliorates renal oxidative stress. Besides, metformin in combination with honey attenuates antioxidant enzymes better than when administered alone. These results further underscore the importance of maintaining optimal glycemic control as well as ameliorating oxidative stress in the management of diabetes mellitus.

P16

Food intake, body weight and sperm parameters in male rats exposed to cigarette smoke and the protective effect of Tualang honey supplementation

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BACKGROUND: Cigarette smoke (CS) exposure has been shown to produce reduced food intake and body weight as well as reduced sperm count and increased percentage of abnormal sperm. The aim of this study was to determine whether Tualang honey supplementation could protect the toxic effects of CS on food intake, body weight and sperm parameters in male rats.

METHODS: Thirty-two adult male Sprague-Dawley rats were randomly divided into 4 groups (n=8/group) ie. control, honey-treated (H), cigarette smoke-exposed (CS) and honey-treated plus CS-exposed (H+CS). Rats in control and CS groups received distilled water (0.5 mL/day) while rats in H and H+CS groups received honey (1.2 g/kg body weight/day) by oral gavage. Rats in CS and H+CS groups were exposed to CS in a chamber for 8 minutes, 3 times per day. Food intake and body weight of each rat were monitored weekly. After 13 weeks of treatment, rats were sacrificed and reproductive organs including vas deferens, epididymis and testes were carefully dissected for sperm analysis.

RESULTS: CS group had significantly reduced food intake and body weight gain compared to control and H groups. There were also significantly reduced spermatid and sperm counts, daily sperm production and percentage of motile sperm as well as increased percentage of abnormal sperm. However, in H+CS group which was supplemented with honey, all these changes were significantly improved except for food intake and body weight gain.

CONCLUSION: Tualang honey has a protective effect against CS-induced abnormal sperm parameters (changes in sperm parameters) in rats. However, it has no significant effects on food intake and body weight gain.

P17

Effects of Malaysian Tualang honey on reproductive hormones, sexual behaviour and fertility in male rats exposed to cigarette smoke

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BACKGROUND: Cigarette smoking is associated with reduction in testosterone level, sexual dysfunction and subfertility in males. The aim of this study was to determine the possible protective role of honey against the toxic effects of cigarette smoke (CS) on male reproductive hormones, sexual behaviour and fertility in rats.

METHODS: Thirty-two adult male Sprague-Dawley rats were randomly divided into 4 groups (n=8/group) ie. control, honey-treated (H), cigarette smoke-exposed (CS) and honey-treated plus CS-exposed (H+CS). Rats in control and CS groups received distilled water (0.5 mL/day) while rats in H and H+CS groups received honey (1.2 g/kg body weight/day) orally by gavage. Rats in CS and H+CS groups were exposed to CS in a chamber for 8 minutes, 3 times per day. From week 10 to 13 of treatment, male sexual behaviour and reproductive performance were evaluated by mating each male with 3 untreated female rats. After 13 weeks of treatment, male rats were sacrificed and blood was collected for hormonal assay.

RESULTS: Rats in CS group had significantly lower testosterone level, mating and fertility indexes, birth weight of the pups and percentage of rats achieving intromission and ejaculation compared to control and H groups. However, supplementation of honey significantly improved all these parameters in H+CS group.

CONCLUSION: Honey has a protective effect on CS-induced impaired fertility and sexual function in male rats by restoring the level of testosterone.

P18

Effects of Malaysian Tualang honey on oxidative stress markers and testicular histology in rats exposed to cigarette smoke

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BACKGROUND: Cigarette smoke (CS) exposure has been shown to produce oxidative stress resulting in testicular damage in rats. The aim of this study was to determine the effects of Malaysian Tualang honey, a natural product that possesses antioxidant activity, on oxidative stress markers and testicular histology in rats exposed to CS.

METHODS: Thirty-two adult male Sprague-Dawley rats were randomly divided into 4 groups (n=8/group) ie. control, honey-treated (H), cigarette smoke-exposed (CS) and honey-treated plus CS-exposed (H+CS). Rats in control and CS groups received distilled water (0.5 mL/day) while rats in H and H+CS groups received honey (1.2 g/kg body weight/day) orally by gavage. Rats in CS and H+CS groups were exposed to CS in a chamber for 8 minutes, 3 times per day. After 13 weeks of treatment, rats were sacrificed and testes were carefully dissected for oxidative stress markers measurement and histological study.

RESULTS: CS group had significantly higher levels of malonaldehyde and glutathione peroxidase activity as well as lower levels of total antioxidant status and superoxide dismutase and catalase activities in the testes compared to control group. There were also significantly smaller seminiferous tubule diameter and epithelial height, and higher percentage of tubules with germ cell loss in rat testes from CS group. However, in rat testes from H+CS group, these changes were significantly improved.

CONCLUSION: Honey reduces CS-induced damage to the testes by reducing lipid peroxidation and restoring the antioxidant system in rat testes.

P19

Histological changes in male accessory reproductive organs in rats exposed to cigarette smoke and the protective effect of Tualang honey supplementation

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BACKGROUND: Cigarette smoke (CS) exposure has been shown to produce testicular damage in rats. However, little is known on the effect of CS on male accessory reproductive organs. Hence, the aims of this study were to investigate the effect of CS on histology of male accessory reproductive organs in rats and to determine the possible protective effect of honey supplementation.

METHODS: Thirty-two adult male Sprague-Dawley rats were randomly divided into 4 groups (n=8/group) ie. control, honey-treated (H), cigarette smoke-exposed (CS) and honey-treated plus CS-exposed (H+CS). Rats in control and CS groups received distilled water (0.5 mL/day) while rats in H and H+CS groups received Tualang honey (1.2 g/kg body weight/day) by oral gavage. Rats in CS and H+CS groups were exposed to CS in a chamber for 8 minutes, 3 times per day. After 13 weeks of treatment, rats were sacrificed and accessory reproductive organs (left epididymis, ventral prostate, and seminal vesicles with coagulating glands) were carefully dissected, weighed and analysed for histological changes.

RESULTS: CS group had significantly higher relative weights of epididymis and ventral prostate compared to control and H groups. There were also significantly higher number of clear cells and epithelial height of cauda epididymis as well as severe interstitial oedema and lower epithelial height of prostate gland. However, in H+CS group, except for the weight of epididymis, these changes were significantly improved.

CONCLUSION: CS exposure causes histological changes in epididymis and prostate gland in rats and honey supplementation significantly has some protective effect against these changes.

P20

Apoptosis study of Madu Lebah Tualang on leukemia cell line and normal mononuclear cell

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BACKGROUND: The aim of this study was to evaluate the apoptosis effect of pure natural honey "Madu Lebah Tualang" on leukemia cell line and normal mononuclear cells.

METHODS; Harvested K562 cell line was incubated with several concentrations of madu for 24 hours. Mononuclear cells were isolated from normal peripheral blood using Ficol Hypaque technique. Then it was incubated with madu at several concentrations. Both cells were incubated in 95% air humidity; carbon dioxide (CO2), 5% and consistency of temperature at 37.0°C. After incubation, they were processed with Apoptosis Detection Kit and finally analysed by Flowcytometry.

RESULTS: Apoptosis was seen in both K562 and Lymphocyte which were incubated with madu. However the percentage of apoptosis was much higher with K562 compared to lymphocyte. At the concentration of IC50 (0.6%), Madu Lebah Tualang gave the 53.9% apoptosis activity to K562, compared to normal mononuclear cells (9.7%) ($p<0.05$)

CONCLUSION: Our local honey (Madu Lebah Tualang) has approved to induce apoptosis to the leukemia cell line K562. Further study on the apoptotic pathway is in progress.

P21

Phenolic content and antioxidant capacity of Malaysian Tualang honey

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BACKGROUND: The objective of this study was to analyze the phenolic content and antioxidant capacity in 11 Malaysian Tualang honey collected from different places.

METHODS: Honey phenolics were investigated by High performance thin layer chromatography (HPTLC) using 1,1-diphenyl-2-picrylhydrazyl (DPPH). The total phenols content was measured through a spectrophotometric determination with a modified Folin-Ciocalteu method. A spectrophotometric analysis using DPPH radical scavenging activity was performed to determine antiradical activity. The ferric reducing anti-oxidant assay (FRAP) determine the total antioxidant activity on the basis of the reduction at low pH of ferric 2,4,6-tris(2-pyridyl)-1,3,5-triazine [Fe(III)-TPTZ] to the ferrous complex followed by spectrophotometric analysis.

RESULTS: Thin layer chromatography analysis with natural product reagent detection showed blue and green-fluorescent spots, indicating phenolic compounds, including flavonoids, extracted from 11 Tualang honey samples. Detection of antioxidants by DPPH spray on HPTLC plate showed the presence of some strong antioxidant constituents that immediately turned purple DPPH to yellow. The polyphenol content of the 11 honey samples were ranged from 306.54 to 424.66 mg gallic acid equivalents/kg. The percentage of DPPH radical scavenging capacity was ranged from 27.56 to 37.93 and total antioxidant capacity by FRAP assay was ranged from 274.16 to 289.13 μM Fe(II)/kg. High phenol content was significantly correlated with high antioxidant capacity.

CONCLUSION: The major antioxidant properties in Tualang honey derive from its phenolic constituents, which are present in relatively large amounts. The total phenolic content and antioxidant capacity varies slightly depending on the sources, places and collection process. There was a good correlation between total phenol content and antioxidant capacity of the honey extracts

P22

Honey – the most sustainable food produced naturally

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Honey, naturally produced from the belly of bees is almost a complete food. If one takes 250gm of honey, one gets approximately 783 kcal, 195 g of carbohydrates, 54 g of water, 0.5 g of protein, 27.5 mg of calcium, 27.5 mg of phosphorus, 1.75 mg of iron, 12.5 mg of sodium, 65mg of potassium, 0.15 mg of Vitamin B2, 0.25 mg of niacin and 0 gm of fat. Daily dosage of 1.2 g/kg body weight for 2 weeks of honey has been shown to improve vitamin C by 47%, B-carotene by 3%, serum iron by 20%, increased monoctes [good immune defence system in the body] by 50% and reduced immunoglobulin E by 34%. Honey improves immune status by increasing T-Killer cell and by improving cytokine functions. Reduced immune status is one of the main reasons of getting cancer and many chronic infections. Honey has been proven to have anti-bacterial, anti-fungal and anti-virus properties. Therefore this would lead to reduce need to use of antibiotics thus combating bacterial resistance such as MRSA. Honey promotes wound healing and has been shown to be very suitable for diabetic wounds and fungating tumour masses. It is widely used in all degrees of burns. It is a powerful anti-oxidant [good in preventing cancer], an effective cough suppressant and has also been researched as weight reduction agent

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The benefit of honey in reducing acute respiratory symptoms among hajj pilgrims

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INTRODUCTION: Acute respiratory symptoms such as cough, rhinitis, sore throat and fever is one of the main health problems encountered by the hajj pilgrims. The possible cause of this problem is multifactorials. Honey is known to contain multiple chemical compounds that is capable in enhancing immune system and has antibacterial, antiviral and antifungal properties.

OBJECTIVES: To determine the effectiveness of Malaysian multi floral wild honey "Madu Lebah Tualang - Agromas" in reducing acute respiratory symptoms amongst Hajj pilgrims.

METHODS: A nonrandomized control trial was conducted among hajj pilgrims during 1407/2007 hajj season. The intervention group (n=56) was given two kilograms of honey and they were requested to consume the honey 20 g twice daily throughout the 42 days hajj journey and to record the respiratory symptoms in the diary provided. The outcomes were compared with the control group (n=41) that received neither honey nor influenza vaccine. Outcome was measured in symptoms score and evaluated statistically using repeated measures ANOVA by SPSS software.

RESULTS: Results showed that group that received honey has significantly lower percentage of symptoms on sore throat and rhinitis during the third week of the journey. No significant differences were noted in the symptoms of cough and fever. The difference of mean symptoms score was maximum on the third week of the journey, however it was not statistically significant between the two groups.

CONCLUSION: "Madu Lebah Tualang - Agromas" is significantly effective in reducing the sore throat and rhinitis on the mid journey amongst Malaysia Hajj pilgrims. It is therefore suggested that honey could be adopted as one of the prophylactic measures in reducing acute respiratory symptoms among Hajj pilgrims.

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The chemical compositions of Tualang honey

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BACKGROUND: Honey contains natural chemicals which vary due to differences in geographical, climatic or seasonal conditions, processing and storing. These variations may also affect the known biological or pharmacological activities even from the same origin of honey. In this study, the chemical compounds of methanolic extract of Tualang honey were investigated. The honey is produced by Asian bees *A. dorsata,* which build the hives on the Tualang (*Koompasia excelsa*) tree.

METHODS: Six honeys were collected from various locations of Tualang trees in Kedah in Mac 2008, filtrated, evaporated and subjected to gamma irradiation. The honey (0.5 g) was extracted with 2 mL of methanol and subjected to gas chromatography-mass spectrometry analysis. Identification of compound was based on mass spectral matching with reference compounds in database (NIST and WILEY) while quantitation was based on reference compounds using standard calibration curves (area vs concentration).

RESULTS: A total of 14-18 compounds were identified in Tualang honeys which had pH of 3.75 ± 0.43. The acidity of honeys may be contributed from the presence of formic and acetic acids. The major compounds were furfural derivatives such as 5-(hydroxymethyl)-furfural or HMF (25.4- 185.6 mg/kg), furfural (46.9 -58.5 mg/kg), 2-furylmethylketone (0.2 - 0.9 mg/kg), 5-methyl furfural (2.2 – 3.6 mg/kg) and fatty acids such as palmitic acid (341.0 -531.4 mg/kg), ethyl linoleate (2.0 - 46.7 mg/kg) and ethyl oleate (1.6 – 19.1 mg/kg).

CONCLUSION: The amount of major chemicals of processed Tualang honey varies greatly. As such, the claimed pharmacological effect of Tualang honey may need to be verified if several sources were to be used.

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HMF and quality evaluation of honeys; Comparison between Tualang, Gelam, Coconut and commercial honeys

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BACKGROUND: Honey is known to be rich in antioxidants such as catalase, flavonoids, alkaloids, polyphenols, carotenoid, vitamins, etc. Some of the compounds are of medicinal properties. Malaysia's honeys are mainly produced by bees such as A*. dorsata* and *A. mellifera.* The honeys get the name from tree which houses the hives of the bees such as Tualang (*Koompasia excelsa*) and Gelam (*Leptospermum flavescens*) or the main source of nectar such as coconut tree (*Cocos nucifera*). Hydroxymethyl Furfural (HMF), a byproduct in honey production has been used as a chemical marker in evaluating the quality of a honey. In this study, HMF and heavy metal levels in honeys from various sources were investigated.

METHODS: Eleven Tualang and three Gelam honeys were provided by FAMA which were collected from various locations in Kedah and Trengganu. Two Coconut and four different brands of honeys were either gifted or purchased from several sources. The honey (0.5 g) was extracted with 2 mL of methanol and subjected to gas chromatography-mass spectrometry analysis. HMF quantitation was based on standard calibration curve (area versus concentration). The pH and heavy metals were measured by pH meter and Atomic Absorption Spectrometer, respectively.

RESULTS: The HMF level (median ± SD, mg/kg) of Coconut honeys was the highest (221.0 ± 49.5) followed by Gelam (114.8 ± 42.2), Tualang (83.7 ± 98.9) and other honey brands (39.4 ± 25.6). Commercialized honeys from New Zealand and Cameron Highland, Malaysia has low HMF levels (20-31 mg/kg). Only 44.4% of the local honeys fulfilled the HMF level requirements (< 80 mg/kg) as outlined by European Union Council Directive. The HMF levels in Malaysia's honey are consistent with reports that honey from tropical climate has higher HMF levels than the cold climate. One honey had elevated mercury level (0.11 ±0.01 ppm).

CONCLUSION: Strict quality assurance may need to be imposed on honey producers in order to improve quality of Malaysia's honeys.

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Tualang honey modifies 7,12-dimethylbenz(α)anthracene (DMBA)-induced mammary carcinoma in rats: A preliminary study

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INTRODUCTION: Breast cancer is common among women with increasing incidence in younger age group. It has been suggested that honey might be useful in preventing the development of cancer. However, there is no study has been conducted in evaluating the potential of honey in inhibiting breast tumor development.

OBJECTIVES: To study the effects of Tualang honey (TH) in inhibiting the initiation and promotion of mammary carcinoma in DMBA-induced rats.

METHODS: Sixteen female Sprague-Dawley rats were fasted overnight prior to oral administration of either 20 mg (bw <120 g) or 25 mg (bw > 120 g) of DMBA. On the next day, animals were randomly divided into four groups with four animals each (n=4). Group 1 was administered with distilled water (control) and Group 2, 3 and 4 with 0.2, 1.0 or 2.0 g/kg TH daily respectively for 150 days by gavaging. Clinical examinations to detect the tumor were conducted twice a week. At the end of the study, all animals were subjected for autopsy and tumors were collected for histopathological examination.

RESULTS: All animals in control group (100%) develop tumor following DMBA-administration. Tumors were detected clinically in 75% of animal in Group 2 and 50% each in animals of Group 3 and 4. Additional smaller size tumors were detected during autopsy in Group 2, 3 and 4 and one rat in Group 4 was completely free from tumor. The total tumor weight and volume in the control group were 11.51 g and 10.82 cm3. Administration of honey reduces the tumor sizes and volumes. The total tumor weight and volume were 3.41 g and 3.47 cm3 in Group 2; 3.83 g and 3.30 cm3 in Group 3; 0.81 g and 0.56 cm3 in Group 4. Histopathological examinations however revealed that adenocarcinoma were detected in all animals with tumors.

CONCLUSION: Tualang honey modifies the incidence and severity of cancerous tumor development in DMBA-induced mammary carcinoma in rats.

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Morphological features of 7, 12-dimethylbenz(α)anthracene (DMBA)-induced mammary carcinoma in Tualang honey- treated rats

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INTRODUCTION: The potential use of honey to cure various illnesses in traditional medicine is well known. The effect of honey on cancers is not extensively studied previously.
OBJECTIVE: We determined the morphology of chemically-induced mammary tumors in Tualang honey-treated rats (TH) and compared them with controls.
METHODS: Sixteen female Sprague-Dawley (SD) rats were fasted overnight prior to oral administration of either 20 mg (BW <120g) or 25 mg (BW >120g) of DMBA. They were randomly divided into four groups (n=4 per group). Animals in Group 1 (control) were given distilled water 0.5 ml daily and Group 2, 3 and 4 were administered 0.2, 1.0 and 2.0 g/kg/day of TH respectively for 150 days. Tumor examination was done biweekly. At the end of the study, part of tumors collected from euthanized rats were stained with H&E and examined under light microscope. The grading system used was according to modified Bloom-Richardson used for human breast cancers.
RESULTS: A total of 24 mammary cancers were harvested from both honey-treated and control rats. The size of the cancers ranged from 0.05 to 3.82 cm3. Those treated with honey developed an average size of 0.46 ± 0.83 cm3 cancers compared to controls; 1.35 ± 1.12 cm3. For the honey-treated rats, eight cancers from Group 2 and four cancers from group 4 were of Grade 1 and 2, while all except one cancer in Group 3 were of Grade 1. Cancers from the control group were of grade 2 and 3. Ductal carcinoma in situ (DCIS) were seen in both honey-treated and control groups. Majority of DCIS were of the cribriform type with a few cancers having papillary configurations. The honey-treated cancer cells appeared more uniform and have denser nuclei. Compared to control, ballooning degenerations of the cancer cells were seen in rat treated with the lowest dose of honey. Numerous eosinophils and lymphocytes were present in honey-treated cancers.
CONCLUSION: Administration of Tualang honey to rats induced with DMBA resulted in smaller size breast cancers, lower-grade and lesser aggressive morphological features compared to control group. Honey also promotes proliferations of eosinophils and lymphocytes.

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Effects of Tualang honey on lung surfactants and histology in male rats exposed to cigarette smoke

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BACKGROUND: Cigarette smoke (CS) has been shown to alter the levels of surfactants and histology of the lungs. The aim of this study was to investigate the effects of honey supplementation on the levels of lung surfactants such as phosphatidylcholine (PC), phosphatidyiglycerol (PG) and surfactant protein-A (SP-A), and lung histology in male rats exposed to CS.
METHODS: Thirty-two adult male Sprague-Dawley rats were randomly divided into 4 groups (n=8/group) ie. control, honey-treated (H), cigarette smoke-exposed (CS) and honey-treated plus CS-exposed (H+CS). Rats in control and CS groups received distilled water (0.5 mL/day) while rats in H and H+CS groups received honey (1.2 g/kg body weight/day) by oral gavage. Rats in CS and H+CS groups were exposed to CS in a chamber for 8 minutes (3 times/day). All rats were sacrificed after 13 weeks of treatment. Bronchoalveolar lavage fluids (BALF) and lung tissues were collected for determination of lung surfactants (PC, PG and SP-A) levels and histological study, respectively.
RESULTS: CS group had significantly higher PC level and PC/PG ratio compared to control group. There were also lower number of Type II pneumocyte as well as higher number and size of alveolar macrophage. The number of macrophage containing carbon particles was found to be higher in CS group. However, in H+CS group, these changes were improved although the levels of PC and PG were significantly lower than the other three groups.
CONCLUSION: This study might suggest that honey has some protective effects against the changes in lung surfactants and tissues induced by cigarette smoke exposure in male rats.

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A comparative study of the effects of Tualang honey on healing of traumatic finger tip injury in comparison with paraffin gauze dressing

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BACKGROUND: Fingertip injuries are commonly seen in Emergency Departments. Regular paraffin gauze dressing (PGD) is a common mode of treatment for it. However it is associated with long period of healing process, pain during frequent change of dressing and hypersensitivity of the healed fingertip. This study is to determine the potential of Tualang Honey dressing (THD) in producing better outcome compared to PGD in treating fingertip injuries.

METHODS: Twenty two patients with fingertip injuries were recruited and randomized into PGD and THD groups. The fingertip wounds were debrided under local anesthesia and dressed with the respective method. Dressings were changed every other day in the first week followed by weekly change till the wound heals. The severity of pain during change of dressing and the duration for the wound to heal were obtained. After at least 3 months post injury, the healed fingertip will be assessed for Two Point Discrimination, hypersensitivity, cutaneous sensibility and sensation to temperature.

RESULTS: The average duration for the fingertip to heal was 3.3 weeks and 3.4 weeks for the THD and PGD group respectively. The average of severity of pain during change of dressing using the Visual Analogue Score (VAS) was 4.1 and 3.8 in the THD and PGD group respectively. The two point discrimination test were normal in all fingers. Cutaneous sensibility using Semmes Weinstein Monofilament Test(SWMT) showed normal sensibility in 2 PGD patients, 13 patients with Diminished Light Touch (10 in THD and 3 in PGD) and 7 with Diminished Protective Sensation (2 in THD and 5 in PGD). Hypersensitivity was found to be absent in 6 patients (3 in THD and 3 in PGD), mild in 15 patients (9 in THD and 6 in PGD) and severe in 1 patient on PGD. Sensation to temperature was intact in 18 patients (10 of THD and 8 of PFD), impaired in 3 patients (1 of THD and 2 of PFD) and absent in 1 patient from the THD group. There were no significant difference between THD and PGD in terms of duration of wound healing ($p=0.546$), pain during change of dressing ($p=0.712$), hypersensitivity ($p=0.074$), two point discrimination, cutaneous sensibility ($p=0.455$) and sensation to temperature.

CONCLUSION: The study showed that Tualang Honey dressing is comparatively as effective as the Paraffin Gauze dressing in treating traumatic fingertip injuries wounds.

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Screening of Pakistani honeys for antibacterial potential against multi-drug resistant Salmonella typhi

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BACKGROUND: Honey is increasingly becoming a part of modern medicine and has been approved for the treatment of chronic skin infections and burns. Its role in systemic infections like typhoid fever is, however, not known. The aim of this study was to determine, if Pakistani honey had antibacterial activity against multi-drug resistant Salmonella typhi

METHODS: One hundred samples of honey from nineteen different floral sources and from different geographical areas of Pakistan were screened for antibacterial potential against MDR Salmonella typhi by agar well diffusion assay. Manuka (UMF-21) honey was used as standard. The antibacterial activity of these honey samples were standardized in accordance with phenol equivalence % (w/v).

RESULTS: Eighteen honey samples demonstrated higher antibacterial activity than manuka honey (16-20% of phenol) at 50% (w/v) dilution. This indicates that these indigenous honey samples posses' higher level of hydrogen peroxide antibacterial properties. Thirty one honey samples showed antibacterial potential between 11-15% of phenol at 50% (w/v) dilution. Whereas fifty one samples did not exhibit any zone of inhibition, stressing the need of antibacterial testing of each honey samples intended to be used in clinical setting. However, all honey samples fail to produce any zone of inhibition after addition of catalase enzyme at 25% dilution (w/v), pointing to the fact that non-peroxide antibacterial activity does not exist in these indigenous honeys samples. Contrary to this, manuka honey inhibited MDR S. typhi at 25% w/v dilution in catalase solution. This confirms the presence of pronounced non-peroxide antibacterial activity in manuka honey.

CONCLUSION: Manuka honey deserves further evaluation in suitable typhoid animal model for future prevention and treatment of typhoid fever.