Diabetes Conference 2017

International Conference on

DIABETES, NUTRITION, METABOLISM & MEDICARE

July 24-26, 2017 Vancouver, Canada

Scientific Tracks & Abstracts | Day 1

Recent advances in the understanding and management of islet amyloid β-cell toxicity in type 2 diabetes and islet transplantation

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Statement of the Problem: Islet amyloid forms by aggregation of the β-cell hormone human islet amyloid polypeptide (hIAPP). Amyloid formation is a pathologic characteristic of the pancreas in type 2 diabetes (T2D) but also forms in transplanted human islets. Islet amyloid is toxic to β-cells and contributes to progressive β-cell loss in both T2D and islet grafts. The current challenge in developing effective therapies to protect islets from amyloid toxicity is our limited knowledge of the mechanisms of amyloid-induced β-cell death in vivo.

Methodology: We performed detailed mechanistic studies by using human islets from cadaveric donors and by generation of different transgenic mouse models, to investigate the apoptotic pathways that contribute to β-cell death caused by formation of hIAPP aggregates in islets and to develop new strategies to protect islets from amyloid toxicity.

Findings: Based on our studies, we propose a new model that links amyloid formation and islet inflammation in T2D and islet grafts. Our studies show that amyloid formation in human islets promotes interleukin (IL)-1β production which leads to β-cell upregulation of the Fas cell death receptor and activation of the Fas-mediated apoptotic pathway initiated by caspase-8. We further demonstrate that amyloid formation disrupts the balance between IL-1β and natural IL-1 receptor antagonist (IL-1Ra). Moreover, impaired processing of prohIAPP associated with β-cell dysfunction potentiates amyloid formation and aggravates IL-1β production. Finally, we provide evidence to suggest that glucagon-like peptide (GLP)-1 agonists and IL-1R antagonists can effectively protect human islets from amyloid toxicity and introduce new strategies that focus on targeting amyloid apoptotic signaling pathway.

Conclusion & Significance: In summary, amyloid formation is closely linked to islet inflammation and plays a significant role in progressive loss of β-cells in T2D and islet grafts. GLP-1 agonists and IL-1R antagonists may efficiently protect human islets from amyloid toxicity in early stages of T2D and clinical islet transplantation.

Biography

Lucy Marzban is an Associate Professor in the Faculty of Medicine, University of British Columbia, Canada. She is a diabetes investigator with expertise in the areas of islet biology, pathology and pharmacology. Her research program focuses on identifying the mechanisms underlying islet β-cell death in diabetes. In past ten years, her team has intensively investigated the mechanisms by which formation of toxic protein aggregates named islet amyloid causes β-cell death in patients with type 2 diabetes and transplanted human islets in patients with type 1 diabetes. Her studies have led to development of a very interesting model and new strategies to prevent progressive β-cell loss in pathologic conditions associated with islet amyloid formation.

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Proteome profiling of C2C12 myotubes with alternated insulin sensitivity upon palmitic acid treatment

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Obesity has a tight association with type 2 diabetes mellitus (T2DM) and elevated plasma free fatty acid level induced insulin resistance is believed as the link between obesity and T2DM. However, the detailed mechanism of the changes in plasma free fatty acid level result in insulin resistance remains to be elucidated. In this study, insulin desensitization was induced in C2C12 myotubes via palmitic acid treatment. To focus on the changes of nuclear proteome, nuclei of C2C12 myotubes were isolated for two-dimensional gel electrophoresis based proteomic study. Result demonstrated that four nuclear proteins showed changes in expression after palmitic acid treatment; nuclear factor NF-kappa-B (NF-κB) p65 subunit and 60S acidic ribosomal protein P0 were upregulated, while peroxisome proliferator-activated receptor gamma coactivator 1-alpha (PPARGC-1α) and cleavage and polyadenylation specificity factor subunit 5 (CFIm25) were downregulated. Whereas, inhibiting NF-κB p65 subunit nuclear translocation can prevent the palmitic acid induced deleterious effect on insulin sensitivity, implied that NF-κB p65 subunit play a key role in palmitic acid induced insulin desensitization.

Methods: A murine skeletal muscle cell line, C2C12 myotubes were established and exposed to first, palmitic acid in order to induce insulin desensitization; and followed by treatment with oleic acid to act as control. To focus on the changes of nuclear proteome in comparing with that of the cytosolic proteomic status, nuclear fractions were enriched by centrifugation for two-dimensional gel electrophoresis (2-DE) based proteomic study.

Results & Discussion: The 2-DE result was confirmed by western blotting analysis Five differentially expressed proteins were found. After 24 h fatty acid treatment, nuclear fractions were enriched and applied to 2-DE. Five proteins demonstrated changes in expression after palmitic acid treatment. Among these five proteins, nuclear factor-kappa-B (NF-κB) p65 subunit and 60S acidic ribosomal protein P0 were upregulated, after exposed to plamitic acid; while peroxisome proliferator-activated receptor gamma coactivator 1-alpha (PPARGC-1α), cleavage and polyadenylation specificity factor subunit 5 (CFIm25) and prohibitin were downregulated. Inhibiting NF-κB activation could rescue C2C12 myotubes from palmitic acid induced insulin desensitization. Inhibiting NF-κB activation by parthenolide reversed the deleterious effects of palmitic acid on Akt activation and insulin stimulated glucose uptake .These results indicated that NF-κB p65 subunit was involved in palmitic acid induced insulin desensitization.

Biography

Ngai Sai Ming is currently Director of The Chinese Medicinal Fungal Proteomics Laboratory and Investigator of State Key Laboratory for Agrobiotechnology and associate professsor in The School of Life Sciences, in The Chinese University of Hong Kong, Hong Kong SAR, China. His research interest is bioinformatics, proteomics and metabolomics, protein/peptide structural and functional studies, and Modern Chinese Medicine. He has over 20 years experience in Protein/Peptide biochemistry, proteomics and computational techniques and is the author of over 70 scientific publications, 4 book chaperters and numerous conference papers.

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Effect of low carbohydrate diet on metabolism in patients with type 2 diabetes mellitus

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Background: Currently, low-fat diet is mainly recommended in America and China [1]. However, the diet among T2DM are not complete accordance to the recommended protocol. Low-Carbohydrate Diet (LCD) achieved greater improvement in the lipid profile and blood glucose stability compared to low-fat diet [2]. In addition, food rich in carbohydrate were preferred by Chinese. It is worth of exploring the feasibility and effect of LCD in Chinese DM patients.

Methods: We total enrolled 31 T2DM patients according to inclusion and exclusion. They were intentionally grouped into LCD group (N = 18) and Low-Fat Diet (LFD) group (N = 20).LFD group received regular loose LFD education (Six points Formulas); LCD group received loose LCD(Six points Formulas) education. After three months, we compared the percentage of energy from three macronutrients, HbA1c, BMI, TC, TG, LDL-C, HLD-C, insulin dose, the frequency of hypoglycemia.

Results: (1) Adherence to LCD and LFD There were three patients missing or excluded in LCD group: one could not complete LCD, one was out-of-touch and another experienced appendectomy. However, four patients could not complete diet regimen in LFD group. (2) The percentages of energy from three macronutrients The percentages of energy from three macronutrients in LCD and LFD after intervention were all met the definition of LCD and LFD. (3) HbA1c The levels of HbA1c between intra-group in two group were significantly decreased (4) Lipids profile Compared with baseline, BMI, TG and HDL - C in LCD group were improved significantly after the intervention($P<0.01$); while BMI only was improved in LFD group($P<0.01$). After the intervention, the serum lipids profile had no difference between groups. (5) Insulin dose There were significantly reduced doses of insulin after intervention in both of groups (6) Hypoglycemia After the 3 months interventions, the frequency of hypoglycemia in LCD group has decreased significantly, compared to the baseline ($P<0.05$). In LFD group, the frequency of hypoglycemia had no significant change.

Discussion: LCD intervention is feasible and easy-operated/ practical for the Chinese T2DM patients. It can effectively improve blood glucose, blood lipid and BMI. At the same time, it can reduce the dosage of insulin in patients with T2DM for the short term. This strategy should be recommended in Chinese T2DM patients.

Biography

Xiao Hua Wang has completed her PhD majored in immunology from Soochow University. She has been the director of Medical Nursing over ten years. She has published more than 30 papers in impact journals and has been serving as a reviewer of some journals.

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Triphala improves glucose and lipid homeostasis by targeting AMPK, inflammation and oxidative stress in human type 2 diabetes

Nita Singh
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Aim/Hypothesis: Ayurvedic formulation "Triphala" had gained consideration as an anti diabetic medicine in the Indian pharmacopeia. Chronic hyperglycemia is often associated with oxidative stress. To address oxidative stress and the related aetiologies viz., dyslipidemia and inflammation, we enhanced the potent antioxidant component E. officinalis and validated this anti diabetic formulation Triphala-411 viz., (Emblica officinalis: Terminalia chebula: Terminalia bellarica::4:1:1).

Methods: Triphala-411 at a dose of 5 grams BD was administered orally for 12 months to human subjects with Type 2 diabetes, (n=20), Impaired glucose tolerance, IGT (n=10) and Normal glucose tolerance, NGT (n=10), based on their blood glucose levels and OGTT as recommended by WHO to assess its anti hyperglycemic, anti hyperlipidemic, anti oxidative and anti inflammatory potentials.

Results: Significant reduction in blood glucose and atherogenic lipids in Triphala-411 treated IGT as well as Type 2 diabetes subjects could be attributed to the enhanced expression of AMP activated protein kinase and decreased expression of protein kinase C. Anti-inflammatory potential as assessed through down regulation of Interleukin-6 and TNF-α, up regulation of Interleukin-10 gene; and antioxidative effect as assessed through significantly increased activity of antioxidant enzymes, reduction in lipid peroxidation, significant reduction in comet tail length and Sub-G1 phase of cell cycle exhibited resistance to stresses developed during progression of Type 2 diabetes. Triphala-411 therapy also addressed diabetic complications as evident from the down regulation of Aldose reductase and Poly- ADP ribose polymerase.

Conclusions: Triphala-411 proved itself as evidence based alternative anti-diabetic formulation owing to its anti-hyperglycemic, anti-hyperlipidemic, anti-oxidative and anti-inflammatory potential.

Biography

Nita Singh has completed her PhD in Biotechnology on identification of cellular target of Triphala with respect to its antidiabetic and antioxidative potential in human subjects with Type II diabetes at the age of 33 years from Department of biotechnology, Jiwaji University, Gwalior and; Pharmacology and toxicology, Defense research and development establishment, Gwalior, India. She is presently working on drug development against hepatocellular carcinoma from natural compounds using insilico approach in All India Institute of Medical Sciences, New Delhi, India. She has published more than 6 papers in peer reviewed journals.

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Special Sessions | Day 2

Mahir Kh I Jallo

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Metformin and the prevention of cancer... Where is the position in 2017?

Obesity and its metabolic complications, including diabetes, have been associated with an increased risk of several cancers. Thus, the potential use of Metformin as a novel cancer prevention strategy has generated much excitement in view of its low cost, favorable safety profile, and its potential for biological specificity in disrupting the association between obesity and cancer. Metformin seems to affect multiple key processes related to cell growth, proliferation, and survival which stem from both metabolic and intracellular-signaling activity. Metformin decreases hepatic glucose production and reduces the bloodstream level and cellular uptake of insulin which results in reduced activation of insulin receptors on cell membranes, triggering a cascade of intracellular molecular effects, which are often activated in many types of cancer cells, in addition to up regulation of AMP-activated protein kinase, a key molecule in glucose and insulin regulation and also an inhibitor of mTOR. Treatment with Metformin has been associated in meta-analysis of case–control and cohorts with reduced breast, colon and pancreas cancer risk, although RCTs confirmed the inverse association or showed no impact of Metformin. It should be remembered that RCTs that find no association between Metformin and cancer were designed to analyze other outcomes, did not include adequate confounding factors and follow-up was too short (maximum 4 years). Despite this evidence the latest meta-analysis shows that Metformin decreased risk only for cancers of the liver, pancreas, colorectal and stomach. A meta-analysis of 8 cohorts, involving 2805 pancreatic patients with diabetes, demonstrated a favorable result for pancreatic cancer with improved overall survival (HR=0.78, 95% CI=0.66-0.92). Metformin treatment is associated with a significant reduction in overall mortality irrespective of diabetes status in patients with endometrial cancer. Using Metformin as a cancer prevention strategy has been controversial and results have been inconsistent, but many analysis reveals that use of the drug is time-dependent, which may explain the disparity. Currently, doubt still remains whether the anti-cancer effects of Metformin observed in *in vitro* and in vivo studies will ultimately translate into clinical benefits in the ongoing clinical trials. While whether Metformin has a clinically-relevant chemo preventive or anti-cancer effect is not clear at present, the evidence from the ongoing human clinical trial studies will help to answer this critical issue.

Biography

Mahir Kh I Jallo is a Faculty in the Canadian Academy of Natural Health and Clinical Professor of Medicine and Consultant Endocrinologist in Gulf Medical University – UAE. He has granted his MB, ChB from Mosul Medical College in Iraq, his postgraduate Board Certification in Internal Medicine CABM from the Arab Board, his Fellowship of American College of Endocrinology FACE. He joined the JCI Accredited Thumbay Hospital in 2004 establishing the Diabetes and Endocrinology unit. He is an active participant and speaker in many national and international conferences and CME programs and organizer of the annual GMU diabetes and endocrinology conference since 2012. He is the Editor In Chief: diabetes digest from Iraq, Editorial Board Member and reviewer for many international diabetes and endocrinology journals, with many publications in medical periodicals and medical conferences abstract. He is active Principle Investigator in many National and International Clinical studies and Member of many national and international medical societies and associations..

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Avner Gal

Iridium Consultancy and Technologies Ltd., Israel

The saga of glucose monitoring: Facts, questions, history and trends

Since introduction of the first blood glucose meter by Bayer, about 36 years ago (1981), trillions of glucose measurements have been conducted by hundreds of millions people. Yet, no clear answers can be established from different users and medical experts in regard to glucose monitoring. Simple and basic questions such as how often, when, what to do with the numbers, which device, what's the accuracy and so on, will produce full scale of answers, not rarely even contradicting ones. No wonder, though, that the diabetes community (general practitioners, diabetologists, endocrinologists) and mainly people with diabetes are confused and frustrated in this matter, which lead to many questions, doubts, uncertainty, insufficient utility in monitoring and reduced adherence in treating the disease. A question should be asked what's the source for this confusion, and more importantly, how can these disputes be resolved, in order to achieve consistent answers, directions and guidelines to the users, as well as to the caregivers.

Method: A deep research scanned the history of the development of glucose monitoring technologies, techniques and devices, analyzed the difficulties, potential causes and reasons for different approaches, variety of ways to read and understand results, as well as using and comparing the numbers. Meaning of accuracy assessments and subjective understandings, methods, clinical and statistical tools were also analyzed. New devices and trends were studied as well.

Results & Discussion: The analysis shows a clear view of an expanded variety of parameters which directly lead to confusion in all the subject matters. Different types of measurements lead to different results, varied time of measurement lead to variation in readings. Availability of more data allows better understanding of the readings and how to use them. Different assessment methods lead to diversity of accuracy levels. Alternative methodologies and conduction of clinical trials cause altered results and understanding of devices' behavior. Comparing levels of other components (for example, blood vs. ISF) lead to inconsistent results. Poor maintenance of the measuring devices and disposables, as well as human factors has major impact on the results. Lack of education reduces the confident and trust in the results, thus the utilization of glucose monitoring decreased.

Conclusions: Deep understanding of glucose levels' measurement and monitoring is a crucial parameter in achieving better utilization and adherence of treatment diabetes (and pre-diabetes). Such a comprehensive briefing is an important step to achieve better appreciation of the complexity of the subject, which may (and should) lead to improved handling and managing diabetes, as well as treating and preventing pre-diabetes progression

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Biography

Avner Gal serves as CEO of Iridium Consultancy and Technologies. Prior to founding Iridium, he founded Integrity Applications in 2001, which developed non-invasive glucose monitoring device. Before integrity, he served as CEO of an Israeli measurement company, which engaged in development of radar and ultra-sonic technologies. From 1999, he served as the Manager of Engineering Department at Comverse Network Systems. Since 1996, he managed a profit center in MTI Engineering Ltd., high-tech consulting company. Prior to entering the private sector, he served for 23 years in various roles in the Israeli Navy, from which he retired as Naval Commander (1995). He received his BSc in Electrical Engineering from the Technion, Israel Institute of Technology, Israel (1982), MSc in Electrical Engineering from Naval Postgraduate School in Monterey, California (1988) and Master of Business Administration in Marketing Management from the University of Derby's Israeli Branch (2000).

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Young Research Forum | Day 3

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Obesity and type 2 diabetes among Cypriot adults based to nationwide study

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Obesity rates in Cyprus are very high and epidemiological information on type 2 Diabetes mellitus is limited. The correlates of type 2 diabetes among adults remain unknown in the Cypriot population. Thus, the purpose of this study is to provide the first national estimate of the prevalence of type 2 diabetes and investigate its correlates. A randomly stratified nationally sample of 1001adults aged 18-80 participated in the study. Only 950 subjects completed the study. All subjects were free of any diseases (known diabetes, kidney, liver), medication and supplementation. The overall prevalence of diabetes and pre-diabetes based on WHO criteria was 9.2% and 16.3%, respectively. After adjusting for age, energy intake, smoking and physical activity participants with obesity (BMI) (OR=2.00, P<0.001), waist circumference (WC) OR=2.08, P<0.001), hypertension (HT) (OR=1.99, P<0.001) and hypercholesterolemia (HC) (OR=2.07, P<0.007) were most likely to develop T2DM compared with the normal ones. The odds of having Diabetes was also found significant between subjects with high levels of Triglycerides (TG) (OR=1.49, P<0.007), compared with the normal ones and between subjects with low levels of HDL (OR=1.44, P<0.008) compared with the ones with high levels of HDL. The prevalence of type 2 diabetes in Cyprus is relatively medium- high. However, the pre-diabetes rates are very high showing a promising increase towards total rates of type 2 Diabetes. Obesity, HT, WC, TG, HC and low HDL are all strong correlates of type 2 Diabetes. Healthy education programs should be initiated for young and older- aged people and those with described abnormal risk factors.

Biography

Eleni Andreou is working as Assistant Professor of Nutrition in Department of Life and Health Sciences, University of Nicosia, Cyprus.

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Complications and comorbidity of diabetes mellitus (DM) among Saudi in northern Saudi Arabia

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University of Hail, Saudi Arabia

DM is an extremely common metabolic disorder with great public health influence because of its harmful consequences triggering severe end-organ damage, including cardiovascular and neurological complications, diabetic retinopathy, and diabetic nephropathy. Therefore, the aim of the present study was to determine the complications and comorbidity of DM in Northern Kingdom of Saudi Arabia.

Methodology: Records of 50 diabetic patients were retrieved from King Khalid Hospital, Hail, KSA. Different complications and comorbidities were recorded and analyzed.

Results: Peripheral neuropath, retinopathy, diabetic septic foot, and amputation were identified among 20/50(40), 19/50(38%), 7/50(14%), and 2/50(4%), respectively. Out of the 50 patients, 12/50(24%), 18/50(36%) and 8/50(16%) were found with thyroid diseases, dyslipidemia and renal complications, in this order.

Conclusion: Diabetes complications and comorbidities including peripheral neuropath, retinopathy, diabetic septic, thyroid diseases, dyslipidemia and renal complications need to be considered in epidemiological studies, so as to monitor disease burden and quality of diabetes care.

Biography

Abdulaziz Khalid Alsayegh is a Medical Intern at University of Hail. He gets a high school diploma with honors from Al-sadeeq high school in Hail, Saudi Arabia in 2011. He is the Leader of Students Club in Hail University and Member of the society of internal medicine at King Abdulaziz University. He holds many certificates in his medical degree, although participated in several medical researches. He got the first prize for the Best Project Award at Dr. Soliman Fakeeh Hospital which was held on August 2015 Jeddeh. He has successfully completed a US hands-on experience in the specialty of internal medicine at Poinciana Hospital Florida, USA in August, 2016 under the supervision of Doctor Don Elton

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The benefits of using the I-port system on insulin-dependent patients

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Patients with insulin-dependent diabetes mellitus (IDDM) show low adherence to insulin injections, which results in poor glycemic control. i-port advance provides a comfortable yet dependable way to inject insulin that allows patients to take multiple daily subcutaneous injections for three days without having to puncture skin for each dose of insulin. Our aim is to evaluate patient satisfaction, glycemic control, and adherence while using this device.

Methods: This prospective study examined IDDM patients. Baseline characteristics and diabetes treatment satisfaction questionnaire status (DTSQs) were collected at baseline and at the end of the follow up. All patients were trained to use the i-Port. We divided them into two groups: regular users of the i-Port who used it for >3 months, and irregular users who used it for <3 months. The local complications during use of the i-Port were recorded.

Results & Discussion: Of the total of 55 patients, 92.7% had type I diabetes, the mean age was 14.96+8.95, 92.7% were used an insulin pen. The patients were divided into 27 regular users and 28 irregular users. Irregular users had a longer duration of DM (p=0.901) at baseline and compared to the regular users, and they were less likely to report non-compliance with insulin usage (p=0.338), more likely to self-inject insulin (p=0.038), and had lower HbA1c (p=0.056). There was no statistical difference in the mean DTSQs score or the mean glycemic control score between groups. At the end of the follow up, the regular i-port usage improved compliance with insulin usage (p=0.028), reduced diabetes-related hospitalization (p <0.001), and reduced the frequency of hypoglycemia (p=0.184). Scarring at i-port site was the most common complication.

Conclusion: Regular i-Port usage improved compliance and decreased hospitalization and hypoglycemic episodes with a non-significant 0.73% reduction in HbA1c.

Biography

Amal M Khan has completed her Bachelor of Medicine Bachelor of Surgery (MBBS) at College of Medicine, Taif University, Taif, KSA. She is an amateur writer, enthusiastic, patient and hard worker Medical Intern. She adores the scientific research and she will contentious the education in Family Medicine Residency program. She was a speaker at local and international conferences and was Best Young Researchers for oral presentation at the 14th international conference and exhibition on targeting diabetes and novel therapeutic, Malaysia. She has published a lot of researches in a field of diabetes. She has attended and participated at a lot of conference and workshop in endocrinology and medical field

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Effect of aqueous extract of leaf and bark of guava (*Psidium guajava*) on fungi *Microsporum gypseum* and *Trichophyton mentagrophytes* and bacteria *Staphylococcus aureus* and *Staphylococcus epidermidis*

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In this study, we investigated the effects of P. guajava on organisms responsible for skin disorders, specifically the fungi: *Microsporum gypseum* and *Trichophyton mentagrophytes*, and bacteria: *Staphylococcus aureus*, and *Staphylococcus epidermidis*. The leaves and bark of the P. guajava plant was harvested from Obasa farm Ijero, Ekiti-State, Nigeria, during the beginning of rainy season in March, 2009. Aqueous solutions were obtained by grinding the leaves and the bark. Mueller-Hinton agar was used to grow the bacteria S. aureus and S. epidermidis. Sabouraud Dextrose broth was used to grow the fungi *Trichophyton mentagrophytes* and *Microsporum gypseum*. Analysis of the antibacterial action of the extracts of guava leaves and bark was carried out at different concentrations, by comparing the mean diameter of the inhibition haloes as a variable. Values were represented as mean ± S.E. An ANOVA Tukey's test was performed to determine the mean difference between the control and the two treatments (S1 and S2). In comparing the tetracycline positive control to both solutions, tetracycline had a significantly ($p<0.05$) stronger inhibition effect than both solutions. This could be due to the fact that tetracycline is a pure chemical while the P. guajava solutions were crude extracts. Both *P. guajava* solutions were effective against inhibiting the growth of bacteria *S. aureus* and *S. epidermidis*, and fungi *M. gypseum* and *T. mentagrophytes*. This supports the reported use of P. guajava in many countries as a traditional herbal medicine.

Biography

A Adeagbo is a BSc (Hon.,) student of Gastroenterology Lab, School of Physiology, University of the Witwaterstrand, Johannesburg, South Africa. He studies Physiology from Olabisi Onabanjo University Nigeria. He has worked with Pinnacle Research Centre Nigeria for two years as a Research Assistant. He is currently working on combination of African herbs in management of diabetic type 1 and type 11 in sub-Saharan Africa

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