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PROCEEDINGS OF  
"CONFERENCE ON RECENT ADVANCES IN  
BIOMATERIALS DEC 17-18 '10"

HELD AT SAVEETHA SCHOOL OF ENGINEERING, SAVEETHA UNIVERSITY, THANDALAM, CHENNAI-602 105,  
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**SAVEETHA UNIVERSITY**

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Proceedings of

**"Conference on Recent Advances in Biomaterials Dec 17-18 '10"**

Held at Saveetha School of Engineering, Saveetha University, Thandalam, Chennai-602 105, Tamilnadu, India

## SCOPE OF THE CONFERENCE

*"The conference will provide a platform for discussing current advancements and future trends in biomaterials for medical and pharmaceutical applications. Through the synergistic approach of applied chemistry and physics, material science, electronics, mechanical engineering, biochemistry and medicine, this Conference on biomaterials includes how the deeper insight into biological events and its interplay with nanotechnology may support the development of a generation of novel materials, micro-nano-devices and molecular level approaches suited to solve relevant biomedical problems both for therapy and diagnostics. The conference will provide an excellent opportunity to meet and forge collaboration with large number of experts with diverse specializations including engineering, basic sciences, medical and dental professionals, etc. For the research scholars and students, CRAB 2010 will be an eye opener and an excellent opportunity to meet experts from various institutions in India and abroad."*

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## THEME 9

# BIOMATERIALS FOR MEDICAL DIAGNOSTICS

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Abstract id:93

### LIPID PEROXIDATION AND ANTIOXIDANT STATUS IN PATIENTS WITH OSTEOARTHRITIS

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**Aim:** Osteoarthritis is a chronic degenerative process within the joints. The aim of the study was to evaluate Oxidative stress and Antioxidant status in patients with Osteoarthritis. **Materials:** The study was conducted in 70 subjects which was divided in to two groups, osteoarthritis patients as cases (n=35) and healthy subjects as controls (n=35). The level of plasma Malondialdehyde (MDA), Reduced Glutathione (GSH) and activity of antioxidant enzyme Glutathione-s-transferase (GST) were assessed in all the subjects. **Methods:** Plasma Malondialdehyde (MDA) was estimated by TBARS (Thio Barbituric Acid Reacting Substances). Plasma Gluathione-s-transferase (GST) activity was estimated by Cayman's GST assay method. Plasma Reduced Gluathione (GSH) was estimated by Moren et al method. **Results:** It was observed that there was a significant increase in level of MDA in Osteoarthritis patients when compared to the controls. The level of antioxidants GST and GSH were significantly decreased in osteoarthritis patients when compared to controls. **Conclusion:** Role of oxidative stress in osteoarthritis is confirmed by the elevated MDA and reduced antioxidant levels in our study. Therefore, measuring MDA level in 40-50 aged group persons will be useful for preventing chronic inflammatory disease by supplementing antioxidants.

**Keywords:** Malondialdehyde, glutathione-s-transferase, glutathione, oxidative stress, antioxidants, osteoarthritis

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Abstract ID:87

### HUMORAL RESPONSE TOWARDS CIRCUMSPOROZOITE PROTEIN (CSP), MEROZOITE SURFACE ANTIGEN1 (MSP-1) AND APICAL MEMBRANE ANTIGEN 1 (AMA-1) AGAINST THE *PLASMODIUM VIVAX*

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*Department of Microbiology, Biomedical Research Unit & Lab Animal Centre (BRULAC), Saveetha Dental College, Saveetha University, Chennai – 77*

The aim of the present study was to find out the humoral response towards synthesized peptides named Circumsporozoite protein (CSP), Merozoite Surface Antigen1 (MSP-1) and Apical Membrane Antigen 1 (AMA-1) against the *Plasmodium vivax* at different stages. To achieve the goal, epitope based sequences of the *P. vivax* (CSP, MSP-1 and AMA-1) were derived with the help of Protean program with DNASTAR tool. That sequences were synthesized using Fmoc chemistry on a automatic peptide synthesizer. After the synthesis, the peptides were cleaved from the resin and purified to homogeneity using gel chromatography. Hereby all the peptides were found to be above 90% pure. And then antipeptide antibodies were raised in the mice using alum as an adjuvant and microsphere called

poly lactide-co-glycolide (PLGA) as the delivery vehicle. Peptide specific IgG levels and peak titres were measured by indirect ELISA. Peptides in microspheres elicited high peptide specific IgG levels and peak titres and the immune response was maintained till 90 days of post immunization in all the CSP, MSP-1 and AMA-1 peptides. The incremental increase in antibody titres were seen with microsphere delivery may result in the sustained release of the antigen. Microspheres present small amounts of antigen continuously to the immune system to stimulate the correct repertoire of B cells (i.e., secreting antibodies). Whereas in the case of alum, due to the poor electrostatic forces in between the adjuvant and peptide, there was no high peak IgG titre value noticed. Also, a very critical point in view of the antibody generation was that, only a single dose of the peptide antigen in microsphere was enough to generate long lasting and high titre antibodies.

Keywords: Circumsporozoite protein; Merozoite Surface Antigen1; Apical Membrane Antigen 1; PLGA; ELISA and IgG

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Abstract ID:85

## EFFECT OF VEGETARIAN DIET ON HEART RATE VARIABILITY ON MENOPAUSE SYNDROME

Sangeetha A, Archana R, Shymala Thirumeni

*Department of physiology, Saveetha medical college*

This study was designed to study the influence of vegetarian and non-vegetarian diet on heart rate variability in menopause syndrome in menopausal women between the age group of 45 to 55 years. The severity of menopausal symptoms was graded using Greene climacteric scale and the influence of diet on the symptoms was graded. Heart rate variability was recorded in both vegetarian and non-vegetarian women with the help of digital physiograph. Long term vegetarian diet significantly reduced anxiety and depression compared to non-vegetarian diet in menopausal women. HF component of heart rate variability was significantly higher in vegetarian women indicating a higher parasympathetic activity in these females which could help them to ease the menopause symptoms and reduce cardio vascular disease.

Keywords: Vegetarian diet; menopausal symptoms; cardio vascular disease

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Abstract ID:82

## FTIR SPECTRAL INVESTIGATIONS ON LIVER OF ALBINO MICE CO-ADMINISTERED WITH SILDENAFIL CITRATE (CAVERTA) AND ETHANOL

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Erectile dysfunction (ED), a multifactorial, impaired relaxation of the smooth muscle cells in the corpus cavernosum and in the penile arteries, is a common denominator in most cases. Sildenafil citrate, also called as Viagra, is a drug used to treat male erectile dysfunction (Impotence). This drug became the first pill approved to treat erectile dysfunction in the United States. Sildenafil is a potent and selective inhibitor of cGMP specific Phospho diesterase 5 (PDE 5) which is responsible for the degradation of cGMP in the corpus cavernosum.

Male Albino mice were co-administered with Sildenafil citrate (caverta) and Ethanol, at appropriate doses. The total number of animals has been divided in to seven groups of six animals each. The liver samples were collected and subjected to FTIR spectral analysis. The Specific extinction co-efficient (K) values were calculated for the selected Lipid bands. From the present study, it has been very well noticed that, as the duration of the drug administration increases, there is a significant and gradual increase in the level of Total Lipids in the case of animals treated with the combined dosage of Sildenafil citrate and Ethanol. UV-VIS spectrophotometric analysis of Liver of the experimental animals treated concomitantly with Caverta and Ethanol confirms the above findings. An attempt has been made to correlate the findings of the present research work with possible variations in the structure and function of the Liver of the experimental Albino mice.

Keywords: FTIR; Caverta; Phospho diesterase

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Abstract ID:67

## RISK FACTOR ANALYSIS AND MANAGEMENT OF URETERAL DOUBLE-J STENT COMPLICATIONS

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Double-J ureteral stents are commonly used biomaterial to manage urinary obstructions. Pain, bladder irritative symptoms, and fever are usually signs of early complications related to double-J stents. As no ideal stent has been described, we confronted with the problems of stent migrations, occlusion, encrustation, fragmentation and stone formation. We review certain cases that highlight a variety of late complications with double-J stents. Following a review of literature, guidelines are established for monitoring potential risk factors as well as management strategies for prevention of possible complications when using double-J stents.

Key Words: Ureteral double; stent migrations; occlusion; encrustation; fragmentation and stone formation

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Abstract ID:63

## CELL – BIOMATERIAL INTERACTIONS

C.Kavitha\*, Prof.Dr.C.V.Subbarao\*\*\*, Saveetha Dental College.

Biomaterials play a pivotal role in medicine. Biomaterials are required to act harmoniously when exposed to body and bodily fluids. Cell- biomaterial interactions play a critical role in tissue engineering, regenerative medicine and biocompatibility of implanted devices. The biomaterial-cell interface is a dynamic region which contains a great deal of important information concerning the interaction of tissue with biomaterial.

An important and interesting reinforcement is the investigation of cell-biomaterial interaction. The success or failure of biomaterials depend on the understanding of complex nature of the interactions with regard to the physical, chemical, biological, molecular and mechanical dynamics. Cell interactions can be positive, neutral or negative connoting bioactivity, biocompatibility and cytotoxicity.

This paper highlights the importance of the intended and inevitable interactions and their methods of investigations.

Key Words: biomaterials; bioactivity; biocompatibility;

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Abstract ID:61

## FTIR SPECTROSCOPIC ANALYSIS OF BILIRUBIN IN JAUNDICE BLOOD

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FTIR spectroscopy has been employed for the analysis of blood content modifications and gives a global vision of the biochemical processes. Since FTIR spectra gives the metabolic photography of the subject, it has wide applications in bio medical field. Jaundice, a kind of medical condition which is the initial clue for the liver injury was chosen for the spectral analysis. Bilirubin consists of an open chain of four pyrrole like rings and it is the bio marker for the jaundice. Bilirubin is a yellow breakdown product of normal heme catabolism which causes the conformational changes in the surrounding protein when iron is released and can be excreted through urine in the form of Urobilinogen and excreted through feces as Stercobilinogen. FTIR spectra were recorded for the sera of healthy and liver diseased subjects in the frequency range 4000-450 cm<sup>-1</sup>. Vibrational Band Assignment has been carried out on the three major regions of FTIR spectrum by comparing the position, relative intensity and shape of the vibrational bands. Intensity Ratio Parameters (IRP) for the prominent modes has been introduced to differentiate the liver disease sera from healthy sera. It has been found that infrared absorbances of jaundice sera are higher than healthy sera. This is well evidence by Scatter Plot and Histogram. For the same three IRP values, we carried out the statistical analysis and the relationship between the two sera was correlated by correlation coefficient. From all those analysis, it has been found that reasonable levels of Bilirubin is beneficial to organisms. It protects tissues against oxidative damage caused by free radicals and other reactive oxygen species. The elevation in bilirubin level causes jaundice which is not an ill ness – only a medical condition. But if it is not treated well it results in liver failure.

Key Words: Since FTIR spectra; Bilirubin; jaundice; Intensity Ratio Parameters

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Abstract ID:54

## ELECTROCHEMICAL CHARACTERIZATION OF PEEK COATED Ti6Al4V ALLOY FOR BIOMEDICAL APPLICATION

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Titanium alloys are widely used in Orthopaedic implant industry for their favourable mechanical properties including bio-compatibility, corrosion resistance, strength and light weight. Titanium promotes bony in-growth and this property is very desirable in joint replacements. However, in the context of fracture fixation implants bony in-growth can make removal of the implant problematic. Additionally, soft tissue in-growth can lead to fibrous adhesions resulting in stiffness of that part of the limb. Poly ether ether ketone (PEEK) on the other hand is relatively bio-inert and does not cause any significant bony or soft tissue in-growth. However, Bio-corrosion has been considered a serious problem for the long durability of Bio-implants in human bodies which can cause adverse physiological effects of metal allergy. In the light of the above, present investigation is aimed at developing PEEK coating on medical grade Ti6Al4V alloy using liquid dispersion technique and characterizing its microstructure & Electrochemical Impedance spectroscopy(EIS) in simulated human body conditions. Microstructure studies reveals excellent bond between PEEK coating and

substrate. EIS studies show the developed PEEK coated Ti6Al4V alloy exhibits superior corrosion resistance when compared with uncoated Ti6Al4V alloy.

**Key Words:** Biomedical; bio-compatibility; corrosion resistance; Electrochemical Impedance spectroscopy

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**Abstract id:98**

## **EVALUATION OF AUTONOMIC ACTIVITY IN ADULTS WITH DIFFERENT BLOOD GROUPS**

**Manishankar S\*, Sivapriya D V, Shyamala thirumeni**

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**AIM:** To determine the degree of autonomic activity in adults with different ABO blood groups. **OBJECTIVE:** To determine the autonomic activity in adults belonging to different blood groups and to study the influence of parasympathetic and sympathetic activity in various ABO blood groups. **PURPOSE OF THE STUDY:** The study was undertaken to find out if there was any difference in autonomic activity among ABO blood groups and if so, to grade the parasympathetic and sympathetic activity according to blood groups. Altered autonomic activity in A and O blood groups could contribute to increased incidence of peptic ulcer in these groups. **MATERIALS AND METHODS:** A cross sectional study was undertaken with 160 subjects recruited from an engineering college with 40 subjects (20 male and 20 female) in each blood group. Heart rate variability was assessed using digital physiograph and autonomic nervous activity was evaluated by frequency domain method. **STATISTICAL ANALYSIS:** One way ANOVA. **RESULTS:** There was statistically significant difference in autonomic nervous activity in different blood groups. The HF, LF, HF/LF values were increased in A group followed by O and it is least for B group. There was no statistically significant difference in LF/HF values in these groups. **CONCLUSION:** The study shows that there is increased parasympathetic and sympathetic activity in A and O groups in comparison to AB and B blood groups. The HF/LF ratio, an indicator of parasympathetic activity was also increased in A and O groups. This clearly shows that there is autonomic imbalance in individuals belonging to A and O groups which might contribute to increased incidence of peptic ulcers in these groups.

**Key Words:** Digital physiograph, Peptic ulcer, Blood groups

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**Abstract id: 99**

## **BACTERIOLOGICAL PROFILE OF PYODERMA WITH SPECIAL REFERENCE TO ANTIBIOTIC SUSCEPTIBILITY IN A TEACHING HOSPITAL**

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**Objective :** To identify the bacterial pathogens from cases of pyoderma and to find out their antibiotic susceptibility pattern. **Introduction:** Pyodermas are the infections of the skin or its adnexa by pus producing microorganisms. The rapid emergence of multidrug resistance in most of the Gram positive bacterial isolates complicates the management of pyoderma. This present study was undertaken to isolate and characterize bacterial pathogens from the clinical

samples in our hospital and to detect the sensitivity pattern of those isolates to the commonly used antibiotics. Method and methodology : Swabs were taken from the purulent lesions and were cultured on Blood agar, Mac conkey agar, Crystal violet blood agar and Chocolate agar. The organisms were identified by standard morphological and biochemical techniques. Antibiotic sensitivity testing was done by using standard disc diffusion technique. Result : Among sixty cases of pyoderma, 92% cases had shown positivity for bacterial growth. The total numbers of isolates were 78, among which 63 (80.76%) were Gram positive cocci, and 15 (19.24%) were Gram negative bacilli. The predominant isolates among Gram positive cocci were Staphylococcus aureus i.e 35 (55.55%), followed by Streptococcus pyogenes 14 (22.23%), CONS 9 (14.28%) and Enterococcus spp. 5 (7.94%). Out of 35 Staphylococcus aureus strains, 3 (8.57%) were MRSA. Staphylococcus aureus had shown 100 % sensitivity to Vancomycin, linezolid and rafampicin, 91% to clindamycin, 82% to Erythromycin and 78% resistant to Cephalixin & 73% resistant to penicillin. Streptococcus pyogenes were 100% sensitive to ampicillin, ciprofloxacin, and vancomycin.

Key Words: Pyoderma, Antibiotic susceptibility pattern

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Abstract id: 101

## TIME DOMAIN ANALYSIS OF HEART RATE VARIABILITY IN ECG RECORDING FOR ASSESSING STRESS LEVEL IN PROFESSIONAL DRIVERS

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PURPOSE OF THE STUDY: HRV is a non-invasive technique which assesses the autonomic activity. Stress through hypothalamo-sympatho-adrenal axis shift towards sympathetic system. To assess the stress level of the drivers change in autonomic activity is analyzed by using time domain HRV. AIM: To evaluate & detect the changes in autonomic activity in professional drivers. METHODOLOGY: In this experimental study, 30 subjects, each in experimental (Professional drivers) & control (non-drivers/others) groups with same age group and socio-economic status participated voluntarily. ECG recording & HRV analysis: DIGITAL PHYSIOGRAPH (INCO – NAVIQUIRE, VERSION -56). During ECG recording; Subject was asked to lie in supine position, and was allowed to relax for 5 min. After relaxation period; ECG was recorded in lead II during normal breathing & deep breathing for 5 min each. From the recording the RR interval data of HRV was obtained. STATISTICAL ANALYSIS: By using, paired 't' test. RESULT: The respective R-R interval of drivers and control during normal breathing was  $1360.14 \pm 374.69$  and  $1047.87 \pm 224.17$  and during deep breathing was  $1302.33 \pm 302.75$  and  $1067.17 \pm 160.37$ . Comparing these two groups statistically, drivers showed significantly lesser value than that of the control group in both the conditions. CONCLUSION: Increase in R-R interval indicates parasympathetic activity and decrease in R-R interval indicates sympathetic activity. In this work drivers showed lesser R-R interval which indicates that their sympathetic activity is increased. The result of the work shows that the drivers as a profession undergo more stress than their counter part in other profession.

Key Words: digital physiograph, stress, professional drivers

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Abstract id: 103

## CORRELATION OF COMPUTERIZED SPIROMETRIC RECORDING WITH BLOOD PARAMETER IN ASSESSING COPD

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**PURPOSE OF THE STUDY:** Computerized Spirometer is used frequently in detecting various lung diseases. By using this instrument various lung function test can be recorded. One of the lung function parameters, peak expiratory flow rate (PEFR) is very important for assessing the treatment of chronic obstructive lung disease (COPD). It determines the severity of air flow obstruction and the endurance of respiratory muscles. The leukocyte, the body's defense mechanism, increases with severity of diseases. In the present work, PEFR recording and leukocyte count were compared to assess the severity of COPD patients. **AIM:** To correlate PEFR with total leukocyte count (TLC) of COPD patients to assess their severity. **METHODOLOGY:** Thirty COPD subjects from Medicine Department of Saveetha Hospital participated voluntarily. PEFR was recorded by using Computerized Spirometer (RMS Helios 401, Recorders And Medicare Systems (P) Ltd). The patient was asked to inspire as deeply as they can, and then exhale into the sensor as hard as possible preferably at least for 6 seconds. TLC by usual lab-investigation procedure. **STATISTICAL ANALYSIS:** Correlation coefficient was calculated between lung function test variable PEFR and TLC. **RESULT:** The mean values of PEFR & TLC were  $215 \pm 49.39$  and  $12,800 \pm 1301.9$  respectively. The result showed that there was strong negative significant correlation (-0.80) between PEFR and TLC ( $p < 0.05$ ). **CONCLUSION:** In the present work, PEFR values were decreased with the severity of COPD whereas the TLC showed an increase with the severity. This inverse relationship may help the family physician to gauge the severity of COPD and send them to the referral centre for early diagnosis and treatment.

**Key Words:** leukocyte, lung function test, spirometer, PEFR

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Abstract id: 105

## EFFECT OF BHASTRIKA PRANAYAMA ON RESPIRATORY MUSCLE FUNCTION IN YOUNG ADULT MALES

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**PURPOSE OF THE STUDY:** Respiratory muscles are skeletal muscles which have the ability to get strengthened and to improve functional outcome in response to exercises like other skeletal muscles. Yogic exercises have the ability to enhance the respiratory muscle functions. So, Bhastrika Pranayama (one form of yogic exercise) has been selected to assess the effect on respiratory muscle function. **AIM:** To study the effect of Bhastrika pranayama on respiratory muscle function in young adult males. **METHODOLOGY:** 40 subjects were trained to perform Bhastrika Pranayama and the study was done for 45 days. The respiratory parameters Peak expiratory flow rate (PEFR), 40 mmHg endurance time & Breath Holding Time were measured before and after practice of Bhastrika Pranayama. **STATISTICAL TOOL:** Paired sample 't' test. **RESULTS:** The study showed that the respiratory parameter PEFR, increased significantly from  $407 + 16.52$  to  $587.50 + 14.46$ , 40 mmHg Endurance time was  $26.05 + 5.17$  and increased significantly to  $69.23 + 1.86$ . & Breath Holding time (BHT) increased from  $30.93 + 3.68$  and to  $85.23 + 3.74$  after the practice of Bhastrika Pranayama. **CONCLUSION:** With increased awareness and interest in health and natural

remedies, yogic techniques including pranayama are gaining importance and becoming increasingly acceptable to the scientific community. Yogic interventions can be successfully used in improving the health and wellness status of a variety of individuals. Practice of Bhastrika Pranayama enhances the respiratory muscle function. The positive results found in the present study might be applied to all college students to improve the pulmonary muscles functions.

**Key Words:** Bhastrika Pranayama, PEFR, 40 mm Hg endurance, Breath Holding time

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Abstract id: 108

## DOES MENSTRUAL CYCLE AFFECT WORK PERFORMANCE? - A BICYCLE ERGOMETRIC STUDY

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**PURPOSE OF THE STUDY:** Bicycle ergometer is the instrument used to measure the work done by an individual in research lab & gymnasium. Female hormone oestrogen has the cardio tonic effect which influences work performance, which will vary during different phases of menstrual cycle. This study assesses the effect of menstrual cycle on work performance in females. **AIM:** To evaluate the influence of menstrual cycle on work performance during mid-follicular and mid-luteal phases of menstrual cycle in young women using bicycle ergometer. **METHODOLOGY :** In this experimental study, 30 young women with age group between 18-25yrs participated voluntarily. During the experiment each subject was asked to perform moderate exercise in bicycle ergometer for 5 min (or) till get tired which ever be the earlier. The above exercise was undergone during mid-follicular & mid-luteal phases of menstrual cycle. Calculation for work done = Wheel circumference x tension x rotation per minute (RPM) =  $78.5 \times 2 \times \text{RPM}$ . Wheel circumference:  $2 \pi r$ ,  $r = 12.5 \text{ cm}$ , (i.e.) 78.5, tension = 2. **STATISTICAL ANALYSIS:** Statistical analysis was done by using paired 't' test. **RESULT:** The mean work done of subjects in mid-follicular phase was  $190 \pm 55.90$  and mid-luteal phase was  $240.9 \pm 57.05$ . The work done during luteal phase was significantly higher than that of follicular phase. ( $p < 0.001$ ). **CONCLUSION:** Females work performance improves during luteal phase. Females who perform on gym to reduce their weight can work more on luteal phase. This helps the athletics and coaches to improve their strategy on work performance while participating in different sports meet during luteal phase.

**Key Words:** Menstrual cycle, Luteal phase, Follicular phase, Work performance

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Abstract id-106

## STUDIES ON THE HYPOGLYCEMIC EFFECT OF HERBAL DRUG ON ALLOXAN INDUCED HYPERGLYCEMIC RATS

K.Bhuvaneshwari and S.Kalaiselvi

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Diabetes Mellitus is among the most common disorders in developed and developing countries. The present study highlights the efficacy of Herbal Formulation (cassia auriculata and *Enicostemma littorale*) on blood glucose, Glycosylated Hemoglobin and Lipid profile in experimentally induced Hyperglycemic rats. Four group of rats were employed namely control, hyperglycemic (alloxan induction 150mg/kg body weight) Herbal drug treated and standard drug (glibenclamide) treated rats. There was a significant alteration in the parameter on alloxan induced rats which were reversed in herbal drug treated rats. The data demonstrated the efficacy of herbal drug which was associated with the hypoglycemic effect.

**Key Words:** Glycosylated Hemoglobin, alloxan, *Cassia auriculata* and *Enicostemma littorale*



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