

PREFACE

Our aim in writing this book was to describe in outline, and to set into context, all the important topics within the information all science discipline. Since this covers a very wide area of science fields, we have not covered any topic in elaborate detail. We have pointed out the topics and in the form of research paper. The result, we hope, is a good introduction to information science area. It is intended primarily for students of information science and related topics, but should be accessible to practitioners.

We have gone into particular topics not well covered elsewhere. For topics such as information library, information zoology and information chemistry, where there are numerous good sources, we have mainly restricted ourselves to an outline with references.

ABOUT THE BOOK

This book covers a collection of topics that reflect the diversity in science subject in modern trends. The aim of this book is to develop a interrelation between all subjects of science and made progress in the field of science. Each chapter has a brief summary of key points at the end. The text is presented as a suit of sequential chapters and an attempt has been made to move beyond the pillars of the science subject and provide idea about all subject relation in the book. Although the material in this book is arranged in progressive way there is flexibility in the order of presentation of topics in science subject.

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Dr. Meghasham N. Narule

Editor

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Chapter 1

Introduction of Chalcone

The Chemistry of heterocyclic compounds is a vast subject and it is not possible to discuss whole of them. Heterocyclic compounds have played an important role in the evolution of life, as dyes, drugs and are also used in many commercially important species. Imines has been paid high attention probably due to its varied range of chemical and biological activities. Recently some Schiff's base found to possess anticancer activity. Schiff's bases have diverse physiological and pharmacological activities e.g. anticancer, antipyretic, anti tubercular, anti-inflammatory and antitumor. Schiff's bases derivatives possess wide range of pharmacological activities like antioxidant, antiinvasive, antiviral, antipyretic, anti-inflammatory, antidepressant, and blood pressure lowering etc. 4-thiazolidinones have reported for their antibacterial, antiparkinsonian and anticonvulsant activities. 4-thiazolidinones find their application as local anesthetics and also as moderate tuberculosis agent. Thiazolidinones which belong to an important group of heterocyclic compounds have been widely explored for their applications in the field of medicine.

Review of research

Chalcone considered being the precursor of flavonoids and isoflavonoids are abundant in edible plant. They consist of a open chain flavonoids in which two aromatic rings are joined by three- carbon α , β unsaturated carbonyl system. The chemistry of chalcone has generated intensive scientific studies throughout the world. Especially interest has been focused on the synthesis and biodynamic activities of chalcone. Chalcone bears a very good synthesis so that variety of novel heterocycles with good pharmaceutical profile can be designed. Chalcone are one of the important secondary metabolite obtained from much edible plant like food, vegetables, tea, spices and natural foodstuffs. They are the precursor for the synthesis of many flavonoids and isoflavonoids. Also they act as a lead molecule for the synthesis of novel heterocyclic derivative that are used to target the biological structure. A wide range of new approaches have been explored by the researchers for synthesis and evaluation of various chalcone and their derivative. The potential of chalcone as an excellent pharmacological agent has been identified and the molecule are developed to be used as an antioxidant, antimicrobial, anticancer, anti-

inflammatory etc. It is a biosynthetic product of shikimate pathway. It is found in a number of biologically active molecules. In recent time, there has been a phenomenon of increase in number of publications on versatile chalcone compounds which reflect the interest in this field throughout the world.

Chalcone (1,3-diphenyl-2-propene-1-one) which possesses the α,β -unsaturated carbonyl system is one of the most ubiquitously found secondary metabolites in the plant kingdom. This structure has always been considered a privileged pharmacophore because of its application in the synthesis of various five and six member heterocyclic compounds as well as its therapeutic activity against a wide spectrum of diseases. 'Chalcone' this common name has been given by Kostanecki. He was the first one to report the chalcone synthesis.

Chalcones are well known intermediates for synthesizing various heterocyclic compounds. The compounds with the backbone of chalcone have been reported to possess various biological activities such as antimicrobial, anti-inflammatory, anticancer, antiviral, antioxidant activities. Chalcones are 1,3-diphenyl-2-propene-1-one, consist of two aromatic rings linked by a three-carbon α,β -unsaturated carbonyl system. Presence of α,β unsaturated carbonyl system in chalcone makes it biologically active.

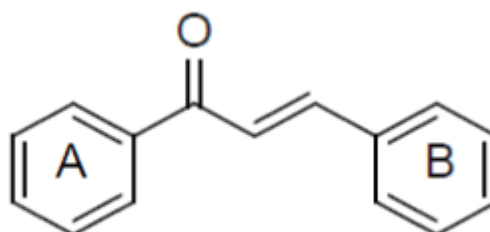


Figure 1: General structure of chalcone.

Chalcones are open-chain precursors for the biosynthesis of flavonoids and isoflavonoids and occur mainly as polyphenolic compounds whose color changes from yellow to orange [3]. They exist as either trans (E, 1) or cis (Z, 2) isomers having two aromatic rings that are joined by a three-carbon α,β -unsaturated carbonyl system (Figure 1). In most cases, the E isomer is more stable from the perspective of thermodynamics, which makes it the predominant configuration among the chalcones. The configuration of the Z isomer is unstable due to the strong steric effects between the carbonyl group and the A-ring [7].

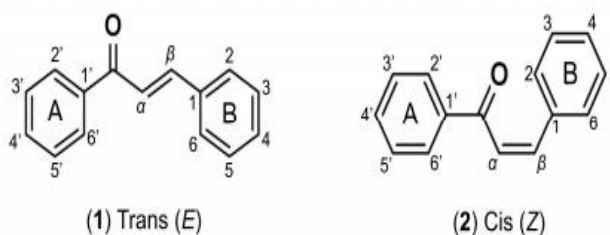


Figure 1. Structural and numerical representations of chalcone scaffold.

Chalcone is a genetic term given to compound bearing 1,3-diphenylprop-2-en-1-one framework. Chalcone are also known as phenyl styryl ketone, benzal-acetophenone, benzylideneacetophenone or alternately called β -phenyl acrylophenone. They contain reactive keto-ethenylic group (CO-CH=CH). Chalcones are widely distributed in nature and originally isolated from natural sources.

The chemistry of chalcone remains a fascination among researcher's in the 21st century due to large number of replaceable hydrogen that allow a large number of derivative and a variety of promising biological activities to be generated .,e.g. anti-inflammatory , anti- oxidant, anti protozoal , anti- obesity, etc. They have displaced a broad spectrum of pharmacological activities changes in their structure have offered a high degree of diversity that has proven useful for the development of new medicinal agent having improved potency and lesser toxicity ^[10].

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Chapter2

Insilco Based Study

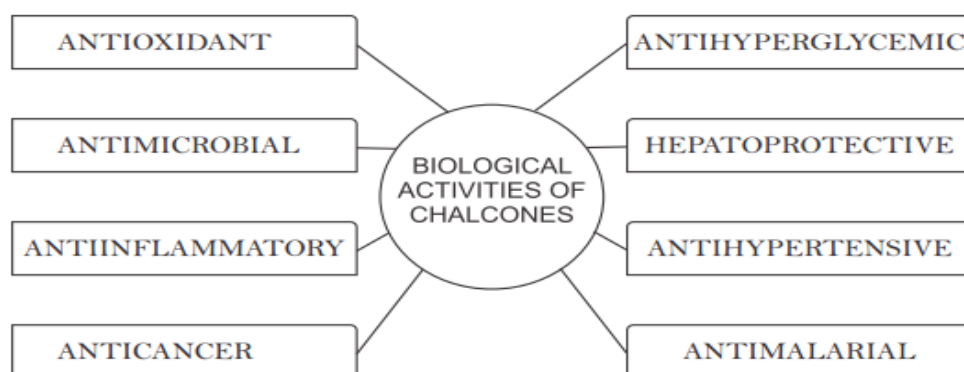
In silicon prediction of biological activity in relation to the chemical structure of a compound is now a commonly used technique in drug discovery and development. It is possible with computer program PASS, to predict the biological activity spectrum for a compound on the basis of its structural formula. It helps in finding most probable new leads with required activity spectra among the compounds from in-house and commercial data bases ^[11].

Molecular docking is a key tool in structural molecular biology and computer-assisted drug design. The goal of ligand—protein docking is to predict the predominant binding mode(s) of a ligand with a protein of known three-dimensional structure ^[12].

Molecular docking has many advantages, such as it certainly reduce the use of solvents and chemicals that can pollute the environment, and also save costs. This method can also be used to predict the activity of compounds such as chalcone by calculating the bonding or energy affinity involved in the interaction with the protein active site. The category of active compounds are if there are interaction of chalcone with the protein, and it is only requires low energy and the interaction have to bind with the protein active site^[13].

Biological activity of chalcone:

The presence of α , β -unsaturated carbonyl system of chalcone makes it biologically active. A number of naturally occurring and synthetic chalcone as well as their derivatives possess many important biological activities. The biological activities exhibited by the chalcones are as follows ^[14].



Chapter 3

Literature survey of chalcone

Vankadari et al. synthesized novel aromatic chalcones with in vitro anticancer property. They achieved the synthesis following Claisen-Schmidt condensation of the appropriate aldehydes and substituted acetophenone using ethanol as solvent in the presence of pulverized potassium hydroxide at 5-10°C in ice bath^[15].

Ilango et al. also reported the synthesis of substituted chalcones with anticancer potential. They prepared O-acetyl-p-acetamido phenol by reacting a mixture of paracetamol, acetic anhydride and concentrated sulphuric acid in a 250 mL round bottom flask equipped with a reflux condenser on a water bath at 50-60°C for 15 min. The compound was obtained after filtration. Compound was added drop wisely on anhydrous AlCl₃ and the mixture heated at 130°C for 3h. To the cooled reaction mixture, crushed ice was added and after extraction and purification 5-acetamido-2-hydroxy acetophenone was obtained. The substituted chalcones were synthesized by reacting appropriate aldehydes with compound in the presence of NaOH, water and ethanol at 25-30°C for 3.5 hr^[16-20].

Suvitha et al. synthesized twenty five chalcone derivatives of anticancer importance. Substituted acetophenone and substituted aldehyde were mixed in ethanol in a round bottom flask placed in an ice bath. To this mixture, they added sodium hydroxide drop-wisely with continuous stirring for 30 min and then for 2-3 hr at room temperature. They obtained the pure product after leaving the mixture in a refrigerator overnight and recrystallized from rectified methanol^[21-23].

Christine synthesized chalcones via Claisen-Schmidt condensation of 3I-bromo-5I-chloro-2I-hydroxyacetophenone and various aromatic or conjugated aldehydes with electron withdrawing or donating properties in the presence of potassium hydroxide in ethanol^[24].

Visagaperumal et al. synthesized 4-hydroxychalcones using microwave assisted synthesis and conventional methodologies. They reacted equimolar quantities of substituted benzaldehydes and 4-hydroxyacetophenones dissolved in alcohol with 3-4 drops of concentrated sodium hydroxide. The chalcones were obtained after stirring for 2-3 hr and leaving the mixture overnight in a refrigerator. The microwave assisted synthesis was achieved simply by irradiating the reaction mixture with 160-320 W radiation for 60-120 sec^[25-26].

Awasthi et al synthesized several new chalcone analogues and evaluated as inhibitors of malaria parasite. Inhibitory activity was determined in vitro against a chloroquine-sensitive *P. falciparum* strain of parasites. The chalcone '3-(4-methoxyphenyl)-1-(4-pyrrol-1-yl-phenyl)prop-2-en-1-one' was found to be the most active with 50% inhibition concentration (IC₅₀) of 1.61 µg/ml. This inhibitory concentration was comparable to a prototype phytochemical chalcone, licochalcone, with an IC₅₀ of 1.43 µg/ml. The study suggested that small lipophilic nitrogen heterocyclic at ring B together with small hydrophobic functionality at ring A can enhance antimalarial activity. These results suggested that chalcones are a class of compounds that provides an option of developing inexpensive, synthetic therapeutic antimalarial agents in the future^[27].

Achanta et al evaluated a series of boronicchalcones for their anticancer activity and mechanisms of action. Among the eight chalcone derivatives tested, the chalcone '3,5-bis-(4-boronic acid-benzylidene)-1-methylpiperidin-4-one' exhibited most potent growth inhibitory activity with IC₅₀ values of 1.5 and 0.6 µM in the 3- (4,5-dimethylthiazol-2-yl)-2,5-diphenyltetrazolium bromide (MTT) assay and colony formation assay respectively^[28].

Echeverria et al studied relationships between the structural characteristic of synthetic chalcones and their anti-tumoral activity. Treatment of HepG2 hepatocellular carcinoma cells for 24 h with synthetic 2'-hydroxychalcones resulted in apoptosis induction and dose-dependent inhibition of cell proliferation. The calculated reactivity indexes and the adiabatic electron affinities using the DFT method including solvent effects, suggested a structure-activity relationship between the chalcone structure and the apoptosis in HepG2 cells. The absence of methoxy substituents in the ring A of synthetic 2'-hydroxychalcones, showed the major structureactivity pattern along the series and because of this, the chalcone '1-(2-hydroxyphenyl)-3-phenylprop-2-en-1-one' was found to be the most active^[29].

Hamdi et al synthesized a series of new coumarin derivatives containing a chalcone moiety and evaluated for possible anti-oxidant and antibacterial activities. The coumarinicchalcone '4-hydroxy-3-(3-p-tolylacryloyl)-2Hchromen-2-one' had been found to be the most active (IC₅₀ = 2.07 µM). The derivatives were screened in vitro for their antibacterial activity against Gram +ve bacteria, *Staphylococcus aureus* using the paper disc diffusion method for the antibiotic sensitivity technique. It showed that the activity against bacteria is moderate, but in addition, it was clearly demonstrated that this kind of compound could be an antibacterial

agent; its activity depends on its chemical composition. The moderate active antibacterial effects observed showed that this kind of compound could be an antibacterial agent^[30].

Some new phenoxychalcones were prepared and screened for their anticonvulsant activity using Maximal Electroshock Method (MES) by Kaushik et al Neurotoxicity study was performed using rotarod method. It was found that substitution of 4-methoxy and 3,4-dimethoxy group in the substituted ring A of phenoxychalcone showed significant anticonvulsant activity without neurotoxicity while hydrogen and chloro substitution does not showed the significant anticonvulsant activity. It was also found that the compounds '3-(4-methoxyphenyl)-1-(4- phenoxyphenyl)prop-2-en-1-one' and '3-(3,4-dimethoxyphenyl)-1-(4-phenoxyphenyl)prop-2-en-1-one' showed the most potent anticonvulsant activity without neurotoxicity. ^[31-32]

Origin of research

From the Literature survey, it is observed that the synthesis of substituted chalcone derivative play an important role in medicinal research. Chalcone derivative have been reported to possess a wide range of pharmacological activity such as anticancer, antimalarial, antioxidant, anti-inflammatory, antitubercular activities.

Therefore, it is the topic of interest to synthesis a substituted chalcone .Furthermore, it will be interesting to evaluate this compound for their different pharmacological activities.

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Chapter 4

Experimental

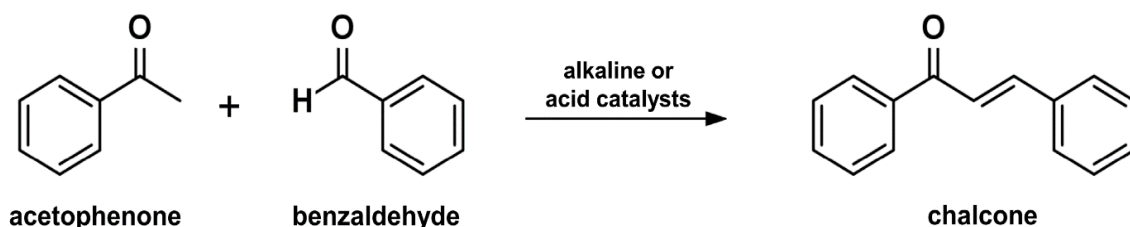
We synthesised four series of compound. The synthesis procedure was carried out by conventional method. All the chemical used were of A.R. grade of Merck India limited make and purchased from commercial suppliers. The melting point of all synthesised compound were recorded using Theil's tube.

Other accessories: Micropipettes, micropipette tips, Ependrop tubes, Solvent (Methanol), petri-dishes (6 inch), Laminar air flow, Autoclave (121 deg celsius, 15psi, 15 min), bore injection, Ethanol (70% and 95%), Samples stock solution (1mg/ml), Standard antibiotic disc Erythromycin (15mcg/disc), Distilled water, etc.

Methodologies:

Chalcone have a simple chemistry which enable a multiplicity of substitution with easy synthesis. Currently a variety of methods and schemes are available for the synthesis of chalcone derivative. Despite the multiplicity of substitution allowed we describes below the reaction scheme using the standard scaffolds of chalcone.

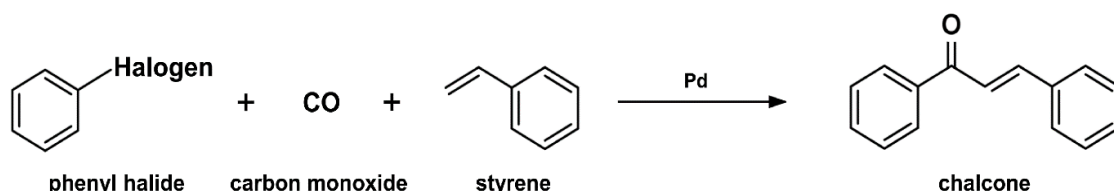
Claisen – Schmidt condensation:



Scheme 1: The Claisen-Schmidt condensation.

Amongst all method, the Claisen – Schmidt condensation is one of the most common. In this reaction chalcone are formed by the condensation of benzaldehyde and acetophenone derivative in presence of alkaline or acid catalyst in liquid solvent at 50-100⁰ C for several hours^[1-3]. In addition, the use of microwave in liquid and solvent free claisen-schmidt reaction reduces synthesis time and yield good amount of chalcone^[4-5].

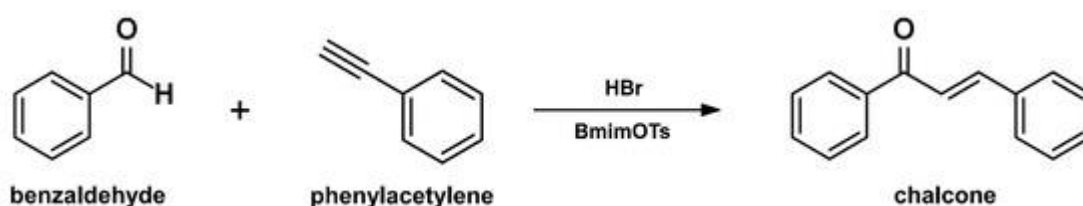
Carbonylative Heck coupling reaction:



Scheme 2: Carbonylative Heck coupling reaction.

In this reaction, chalcone are synthesized by carbonyl active vinylation of phenyl halide with styrene in presence of carbon monoxide and by using palladium (Pd) as catalyst ^[6].

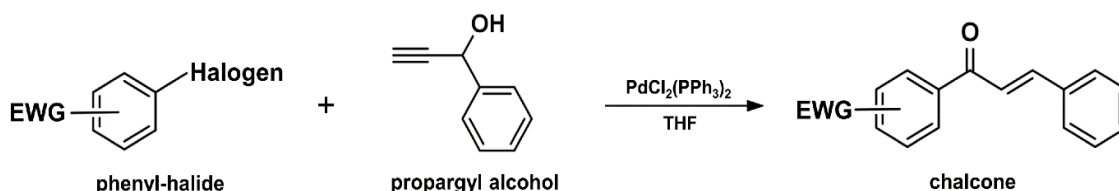
Coupling Reaction:



Scheme 3: Coupling reaction.

Chalcone are synthesized by coupling reaction (scheme 3) between benzaldehyde and phenylacetylene in the presence of HBr and ionic liquid ,such as 1-butyl-3-methyl-1H-imidazolium 4-methylbenzenesulfonate (BmimOTs) for 12 hours at 100⁰C^[7].

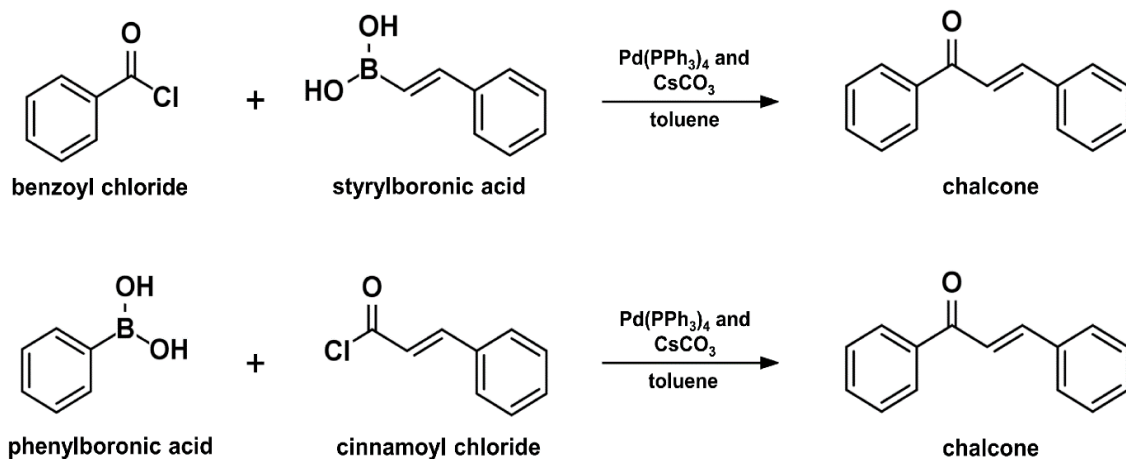
Sonogoshira Isomerisation Coupling:



Scheme 4: Sonogoshira Isomerisation Coupling.

In the sonogoshira isomerisation coupling reaction, chalcone are synthesized through a reaction between the equimolar concentration of electron deficient phenyl halide and propargyl alcohol employing microwave irradiation and using PdCl₂(PPh₃)₂ as a catalyst and THF as a solvent^[8-9].

Suzuki-Miyara Coupling Reaction:

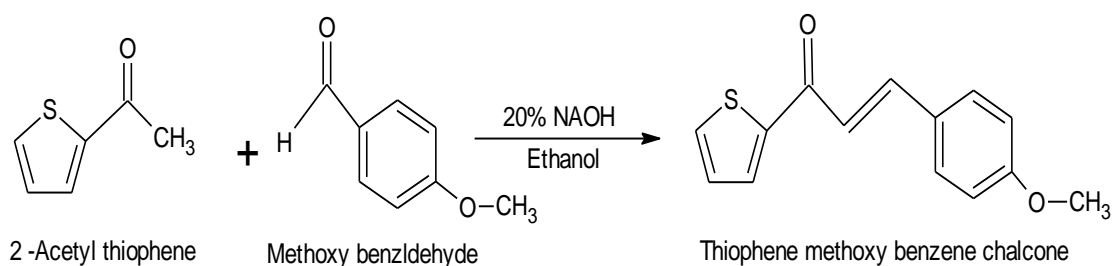


Scheme 5: Suzuki-Miyara Coupling reaction.

In the Suzuki – Miyara Coupling reaction, chalcone synthesis involves the coupling of benzoyl chloride with styrylboronic acid employing $\text{Pd(PPh}_3)_4$, CsCO_3 and anhydrous toluene or coupling of phenylboronic acid with cinnamoyl chloride employing $\text{Pd(PPh}_3)_4$, CsCO_3 , and anhydrous toluene^[10].

Synthesis of substituted chalcone:

In the present study, 2 –Acetyl thiophene treated with methoxybenzaldehyde in presence of 20% NaOH in ethanol by using Claisen – Schmidt condensation to get thiophenemethoxy benzene chalcone.



5bvf is a protein that has its biochemical function in DNA binding, it is having basic biological function in protein phosphorylation. It is present in cellular cytoplasm. 4VJ act as inhibitor of 5bvf protein.

Fig. 1 : Natural Inhibitor 4VJ and its Physicochemical Properties

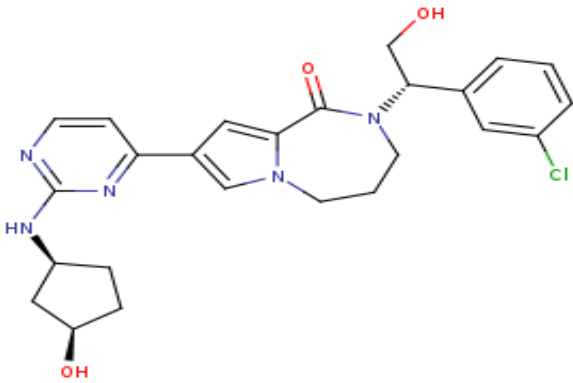
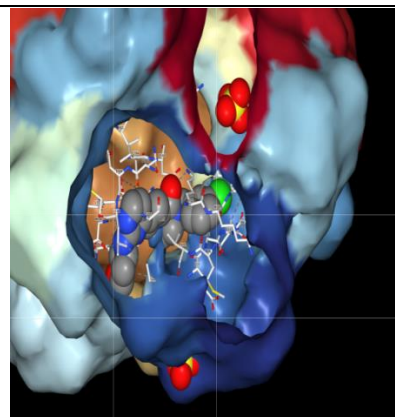
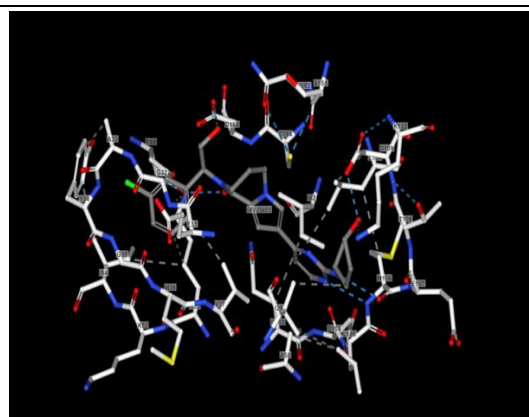
<p>Natural Inhibitor 4VJ of protein 5bvf^[11-13]</p>	
<p>Chemical name</p>	<p>2-[(1S)-1-(3-chlorophenyl)-2-hydroxyethyl]-8-(2-[[1S,3R)-3-hydroxycyclopentyl]amino}pyrimidin-4-yl)-2,3,4,5-tetrahydro-1H-pyrrolo[1,2-a][1,4]diazepin-1-one</p>
<p>Molecular formula</p>	<p>$C_{25} H_{28} Cl N_5 O_3$</p>
<p>Molecular Weight</p>	<p>481.98</p>
<p>Type</p>	<p>NON-POLYMER</p>

Fig.2: Tetrahydropyrrolo-diazepones as inhibitors of ERK2 kinase Ball and stick model of natural inhibitor 4VJ of protein 5bvf [14-17]

**Protien-
Ligand
Energy
Kcal/mole**



**-8.05466
kcal/mol**

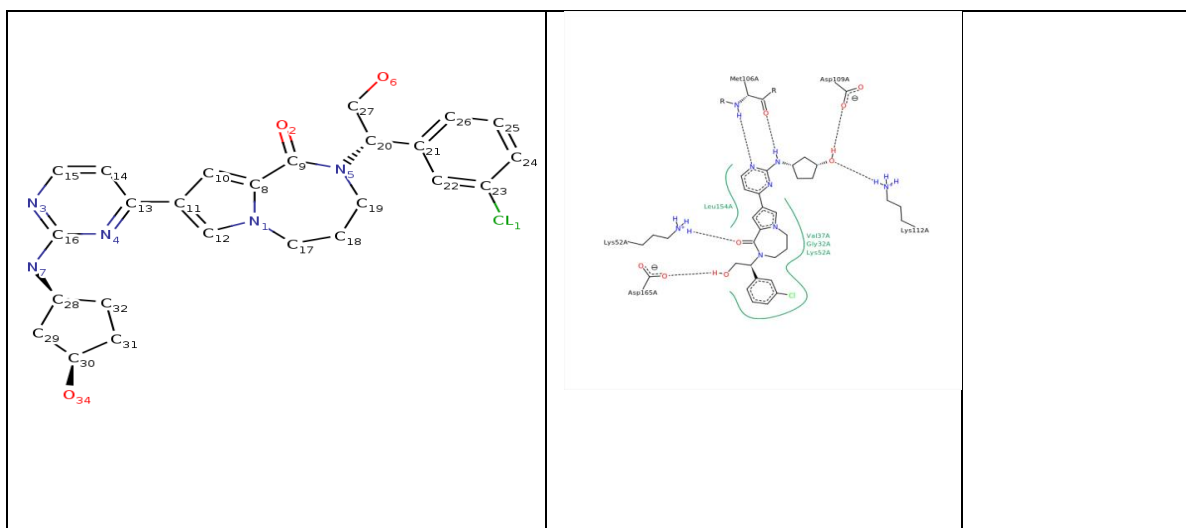


Table no.1: Chemical properties of Substituted Chalcone.

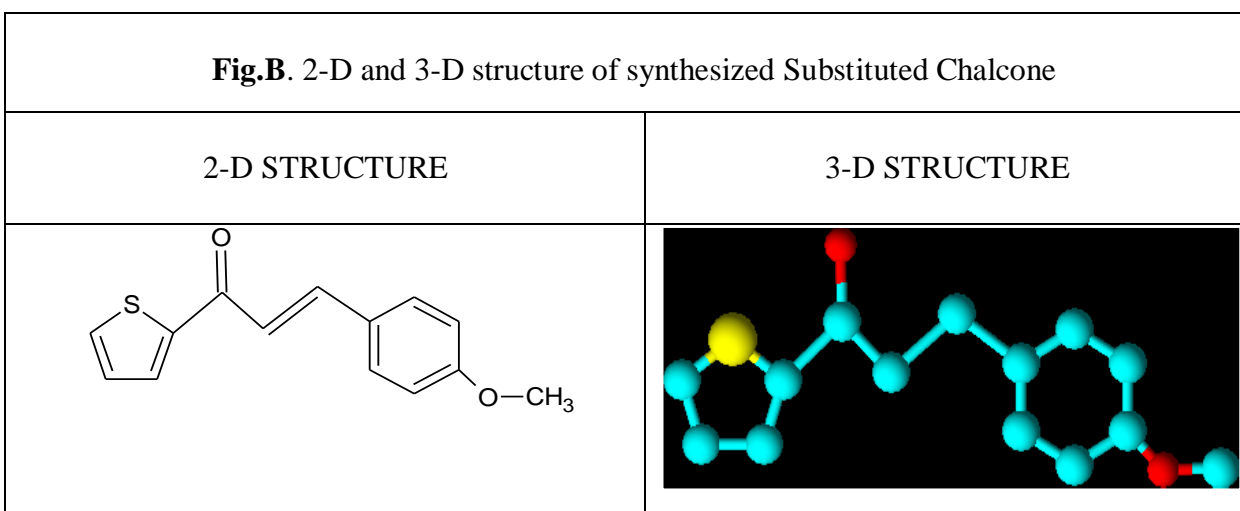
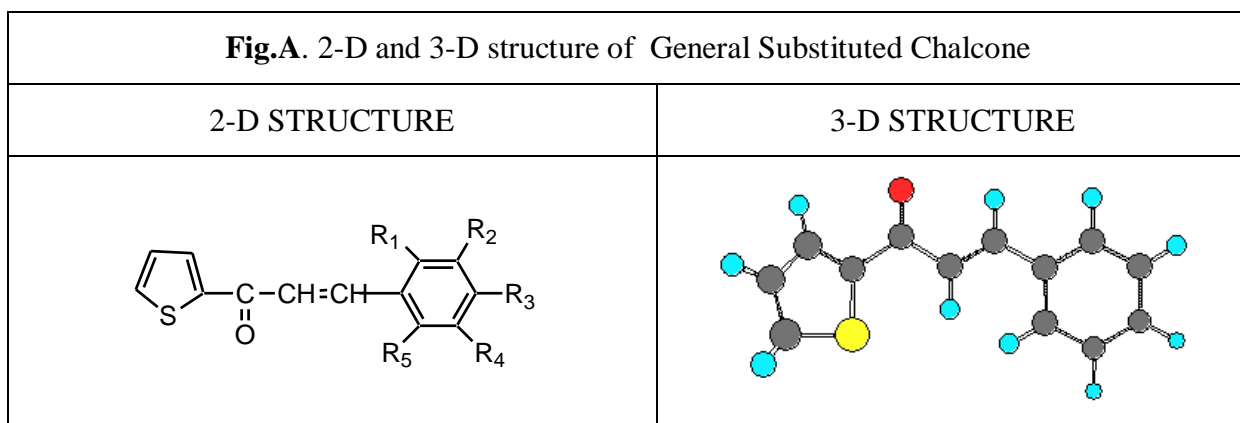


Table no.2: Synthesis of substituted chalcone.

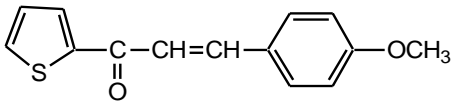
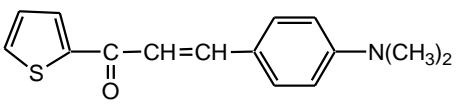
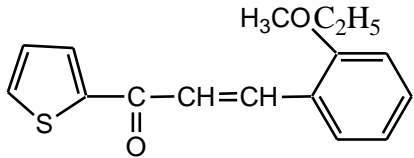
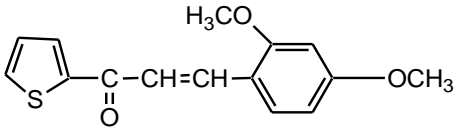
SR. NO	2D STRUCTURE	R ₁	R ₂	R ₃	R ₄	R ₅
A ₁		-H	-H	-OCH ₃	-H	-H
A ₂		-H	-H	-N(CH ₃) ₂	-H	-H
A ₃		-OCH ₃ -C ₂ H ₅	-H	-H	-H	-H
A ₄		-OCH ₃	-H	-OCH ₃	-H	-H

Table no. 3: Synthesis of synthesized substituted chalcone.

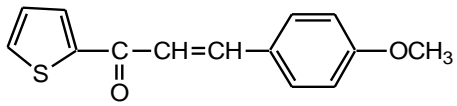
SR. NO	2D STRUCTURE	R ₁	R ₂	R ₃	R ₄	R ₅
A ₁		-H	-H	-OCH ₃	-H	-H

Table no.4:Physicochemical parameter of substituted Chalcone

Exact Mass Grams/Mole	Total energy in eV
532.185	-5703.43
532.185	-5605.01
566.216	-6221.6
566.143-	-6401.01

Table no.5:Physicochemical parameter of substituted Chalcone

Molecule	Stretch	Bend	Stretch-Bend	Torsion	Non -1,4 VDW	1,4 VDW	Total	Steric energy for frame
A1	43.9325	23.4532	-2.1808	9.0117	4870.429 0	19.209 1	4963.8546	1:4963.855
A2	64.9826	23.5442	-2.2582	22.7106	10730.79 20	13.432 8	10853.203 1	1:10853.203
A3	63.9255	27.3066	-2.9020	13.5220	9948.780 2	20.053	10070.685 6	1:10070.686
A4	43.9359	33.0818	-2.3167	13.5537	11027.08 12	27.760 2	11143.096 1	1:11143.096

Chapter 5

Biological Activities

Micro-organism: *S. aureus*(*Staphylococcus aureus*) :

1. *Staphylococcus aureus* is a Gram-positive, round-shaped bacterium that is a member of the Firmicutes; it is a usual member of the micro biota of the body, frequently found in the upper respiratory tract and on the skin. It is facultative anaerobes that can grow without the need for oxygen. It can cause various infections which include skin infections including abscesses, respiratory infections such as sinusitis, and food poisoning.

Scientific classification:

Domain: - Bacteria

Kingdom: - Eubacteria

Phylum: - Firmicutes

Class: - Coccus

Order: - Bacillales

Family: - Staphylococcaceae

Genus: - Staphylococcus

Species: - *Staphylococcus aureus*(*S. aureus*)

Pathogenic strains often promote infections by producing factors such as potent protein toxins, and the expression of a cell-surface protein that binds and inactivates antibodies. At experimental level *S. aureus*(ATCC 43300) strain was utilized.

The strain is resistant to methicillin and oxacillin.

2. *Escherichia coli* (*E.coli*):

Escherichia coli also known as *E. coli* is a Gram-negative, facultative anaerobic, rod-shaped, coliform bacterium of the genus *Escherichia* that is commonly found in the lower intestine of warm-blooded organisms (endotherms). Most *E. coli* strains are harmless, but some serotypes can cause serious food poisoning in their hosts, and are occasionally responsible for product recalls due to food contamination.

Scientific classification:

Domain: - Bacteria

Phylum: - proteobacteria

Class: - Gammaproteobacteria

Order: - Enterobacteriales

Family: - Enteriobacteriaceae

Genus: - Escherichia

Species: - coli

At experimental level *E.Coli*(DH5-Alpha) strain was utilized.

Media:-

a) **Nutrient agar:** Nutrient agar was used to retrieve *S. aureus and E.coli*.

. Ingredients	g/lit
Peptone	10.00g/lit
Beef extract	10.00g/lit
Sodium chloride	5.00g/lit
Agar	12.00g/lit
pH	7.3
Distilled water	1000ml

b) **Muller-Hinton agar:**

Ingredients	g/lit
Beef Extract	2.00 g
Acid Hydrolysate of Casein	17.50 g
Starch	1.50 g
Agar	17.00 g

Of the many media available, Mueller-Hinton agar is considered to be the best of the many media available, Mueller-Hinton agar is considered to be the best for routine susceptibility testing of non-fastidious bacteria for the following reasons:

* It shows acceptable batch-to-batch reproducibility for susceptibility testing.

* It is low in sulphonamide, trimethoprim, and tetracycline inhibitors.

* It gives satisfactory growth of most non-fastidious pathogens.

* A large body of data and experience has been collected concerning susceptibility tests performed with this medium. Although Muller-Hinton agar is reliable generally for susceptibility testing, results obtained with some batches may, on occasion, vary significantly. If a batch of medium does not support adequate growth of a test organism, zones obtained in a disk diffusion test will usually be larger than expected and may exceed the acceptable quality control limits.

pH:

The pH of each batch of Mueller-Hinton agar should be checked when the medium is prepared. The exact method used will depend largely on the type of equipment available in the laboratory. The agar medium should have a pH between 7.2 and 7.4 at room temperature after gelling. If the pH is too low, certain drugs will appear to lose potency (e.g., aminoglycosides, quinolones, and macrolides), while other agents may appear to have excessive activity (e.g., tetracycline). If the pH is too high, the opposite effects can be expected.

Moisture:

If, just before use, excess surface moisture is present, the plates should be placed in an incubator (35 deg C) or a laminar flow hood at room temperature with lids ajar until excess surface moisture is lost by evaporation (usually 10 to 30 minutes). The surface should be moist, but no droplets of moisture should be apparent on the surface of the medium or on the petri-dish covers when the plates are inoculated.

Effect of thymine and thymidine:

Media containing excessive amounts of thymidine or thymine can reverse the inhibitory effect of sulphonamides and trimethoprim, thus yielding smaller and less distinct zones, or even no zone at all, which may result in false-resistance reports. Mueller-Hinton agar that is as low in thymidine content as possible should be used. To evaluate a new lot of Mueller-Hinton agar, *Enterococcus faecalis* ATCC 29212. Satisfactory media will provide essentially clear, distinct zones of inhibition 20 mm or greater in diameter. Unsatisfactory media will produce no zone of inhibition, growth within the zone, or a zone of less than 20 mm.

2.4 Gram staining of bacteria:

Gram staining is the general method to differentiate bacteria on basis of cell envelope constitution. The Gram stain procedure distinguishes between Gram positive and Gram-negative groups by colouring these cells red or violet. On basis of peptidoglycan constitution in bacteria, Gram positive bacteria stains violet while Gram negative bacteria stains pink or red in colour. As Gram positive bacteria consist of thick peptidoglycan layer crystal violet stain retains while Alternatively, Gram negative bacteria stain red, which is attributed to a thinner peptidoglycan wall, which does not retain the crystal violet during the decolouring process.

Gram staining protocol:

- Crystal violet (primary stain)
- Iodine solution/Gram's Iodine (mordant that fixes crystal violet to cell wall)
- Decolorizer (e.g. ethanol 95%)
- Safranin (counter stain)
- Water (preferably in a squirt bottle)

1. Heat fix the cell sample on the slide by carefully passing the slide with a drop or small piece of sample on it through a Bunsen burner till it completely dries.
2. Add the primary stain (crystal violet) to the sample/slide and incubate for 1 minute. Rinse slide with a gentle stream of water for a maximum of 5 seconds to remove unbound crystal violet.
3. Add Gram's iodine for 1 minute- this is a mordant, or an agent that fixes the crystal violet to the bacterial cell wall.
4. Rinse slide with acetone or alcohol 95% for ~3 seconds and rinse with a gentle stream of water. The alcohol will decolorize the sample if it is Gram negative, removing the crystal violet. However, if the alcohol remains on the sample for too long, it may also decolorize Gram positive cells.
5. Add the counter stain, safranin, to the slide and incubate for 1 minute. Wash with a gentle stream of water for a maximum of 5 seconds. If the bacteria is Gram positive, it will retain the primary stain (crystal violet) and not take the counter stain (safranin), causing it to look violet/purple under a microscope. If the bacteria are Gram negative, it will lose the primary stain and take the secondary stain, causing it to appear red when viewed under a microscope.

On Gram staining, bacteria appeared to be cocci shaped which divide in more than one plane to form grape like clusters, this is the characteristic feature of *S. aureus*

2.5 Solubility:

It is found that the solubility of chalcone was found to be in methanol, ethanol, 1-propanol, 2-propanol, 1-butanol and ethyl acetate ^[11]. It was found that the solubility of substituted chalcone is in Methanol.

2.6 Determination of antibacterial activity by the well-diffusion method:

Antibacterial activities of the synthesized substituted chalcone were determined using Gram-positive bacteria (*S. aureus*) following a modified well diffusion method. In brief, the bacteria were retrieved in Nutrient agar (HiVeg media) at 35°C in an incubator. A lawn of retrieved bacterial culture was prepared on the incubation period of 24h. The plates were allowed to stand for 10–15 min. One of the bacterial colonies was selected from retrieved bacterial culture and was inoculated in nutrient broth with the overnight incubation duration. The Muller-Hinton agar petri dishes (6inches) were prepared with the well size of 5 mm (approx. 6-8 wells each plate) was punched into the agar. By the use of cotton swaps the bacterial culture was uniformly spread. Using a micropipette, 90 µL of the nanoparticles solution sample, solvent and absolute stock solution was inoculated into each of wells in all plates. After incubation at 35°C for 24 hours, the size of the zone of inhibition was measured. A solvent blank was run as a negative control whereas the antibiotic (Erythromycin 15 mcg/disc) was used as a positive control.

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Chapter 6

Characterization

In the present work, Fourier Transform Infrared Spectroscopy (FT-IR), Mass spectrometer measurements were carried out to study the structural and molecular weight properties of the as synthesized substituted chalcone nanostructures and therefore their working mechanism has been discussed in subsequent section.

3.1 Fourier Transform Infrared Spectroscopy:

Optical spectroscopy has been widely used for the characterization of organic compound and the spectroscopy techniques are generally categorized into two groups: absorption and emission spectroscopy and vibration spectroscopy. Vibration spectroscopy describes the variations in vibration motion of atoms in a molecule which are greatly influenced by the masses of atoms, their geometrical arrangement and strength of their chemical bonds. The FTIR spectroscopy provides data about the chemical bonding in a material particularly valuable for the non-destructive analysis of solids and thin films using 3000 Hyperion Microscope with Vertex 80 FTIR System, to increase sensitivity one and second scans can be added together to figure out the random noise. Also, it provides an accurate measurement method which needs no external calibration. A simplified schematic layout of a typical FTIR spectrometer is illustrated in Fig. 3.1. In infrared spectroscopy, IR radiation is passed over a sample. Some of the radiations are absorbed by the sample and some of these are passed through (transmitted). The resulting spectrum signifies the molecular absorption and transmission, creating a molecular fingerprint of the sample.^[1]

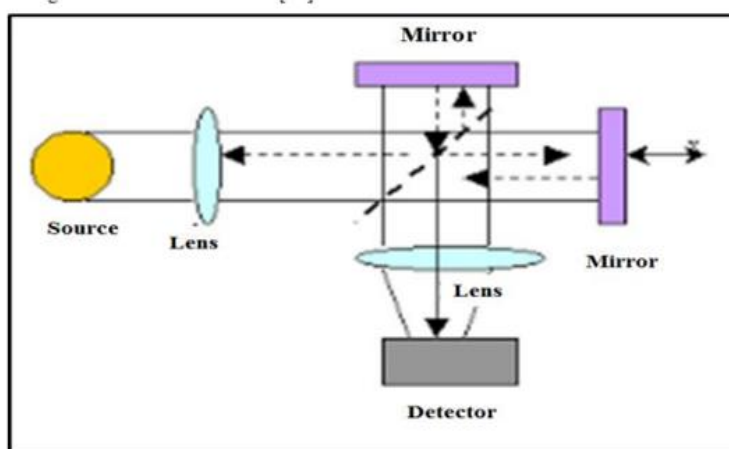


Fig: 3.1:Schematic diagram of FT-IR spectroscopy

3.2 Mass spectrometry:

Mass spectrometry (MS) is an analytical technique that ionizes chemical species and sorts the ions into a spectrum based on their mass-to-charge ratio. In simpler terms, a mass spectrum measures the masses within a sample. Mass spectrometry is used in many different fields and is applied to pure samples as well as complex mixtures.

A mass spectrum is a plot of the ion signal as a function of the mass-to-charge ratio. These spectra are used to determine the elemental or isotopic signature of a sample, the masses of particles and of molecules, and to elucidate the chemical structures of molecules and other chemical compounds.

In a typical MS procedure, a sample, which may be solid, liquid, or gas, is ionized, for example by bombarding it with electrons. This may cause some of the sample's molecules to break into charged fragments. These ions are then separated according to their mass-to-charge ratio, typically by accelerating them and subjecting them to an electric or magnetic field: ions of the same mass-to-charge ratio will undergo the same amount of deflection. The ions are detected by a mechanism capable of detecting charged particles, such as an electron multiplier. Results are displayed as spectra of the relative abundance of detected ions as a function of the mass-to-charge ratio. The atoms or molecules in the sample can be identified by correlating known masses (e.g. an entire molecule) to the identified masses or through a characteristic fragmentation pattern.^[2]

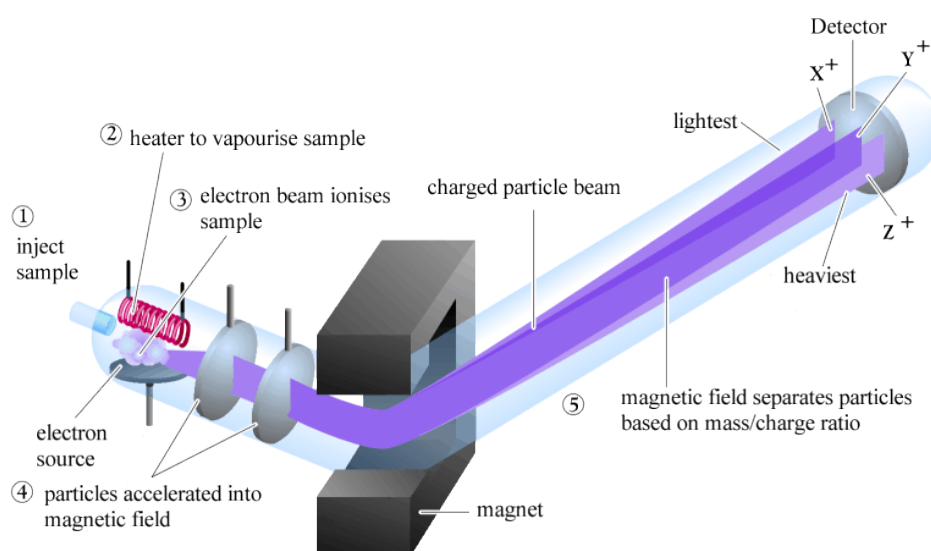


Fig 3.2: Schematic diagram of Mass Spectrometry.

References:

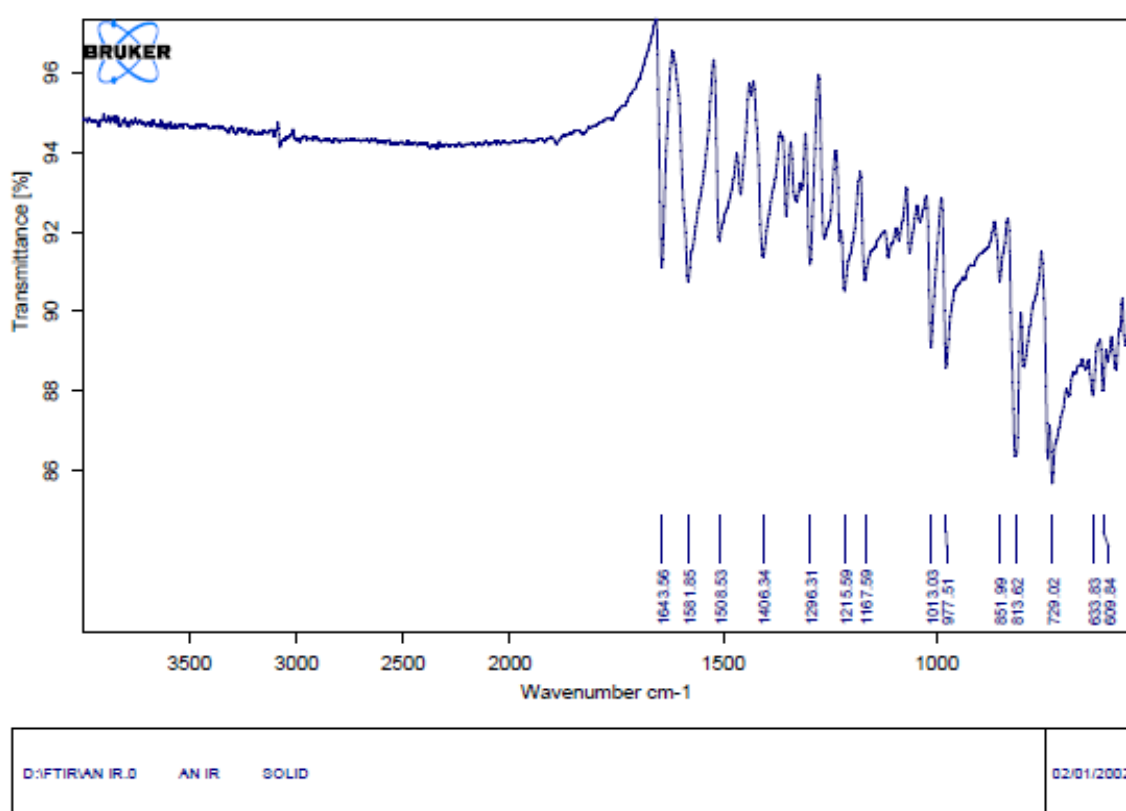
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Chapter 7

Result & Discussion

A Simple and most efficient synthesis of substituted chalcone without using any catalyst at room temperature is noted. The current procedure does not require the use of catalyst or the use of toxic solvent to produce substituted chalcone.

4.1 FT-IR Spectroscopy:



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Fig 4.1: Representation of FT-IR spectra of substituted Chalcone.

FT-IR spectrum revealed that the prominent peak of C=C is found to be at 1520-1580 cm⁻¹, α - β unsaturated ketones show at 1643-1645cm⁻¹ and C-O at 1013 cm⁻¹. This study revealed that the compound formed is chalcone.

4.2 Mass spectrometry:

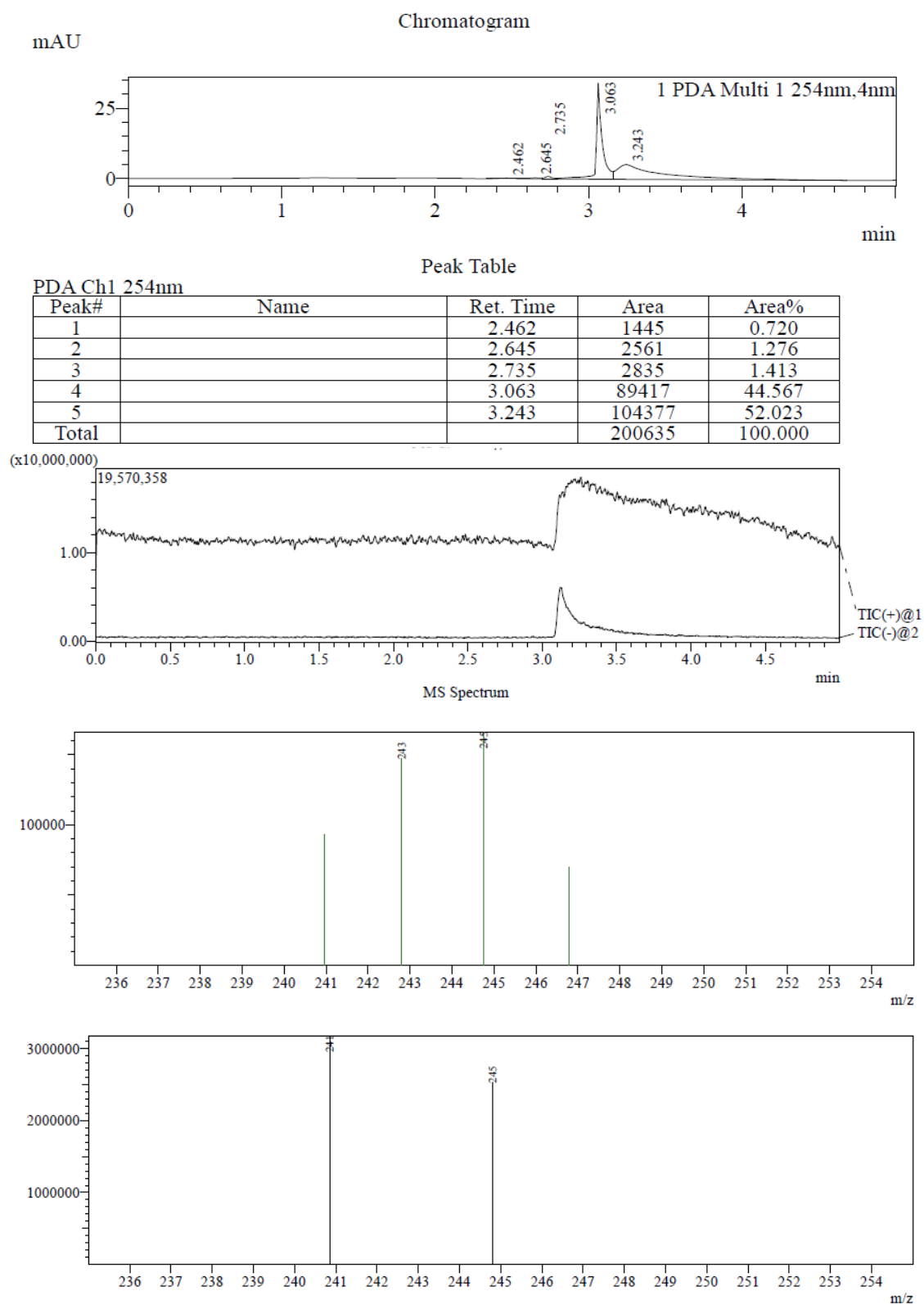


Fig 4.2: Representation of LCMS spectra of Substituted Chalcone.

According to LCMS study, the prominent peak appear at 245 m/z (M+1) and the molecular weight was revealed as 244. Hence , we can say that the desired substituted Chalcone is formed.

4.3 Antibacterial activity of substituted chalcone:

Sample concentration($\mu\text{g/ml}$)	Zone of inhibition(mm)
10	11
20	11
30	12
40	13
50	13
60	14
70	16
80	17
90	18
100	20

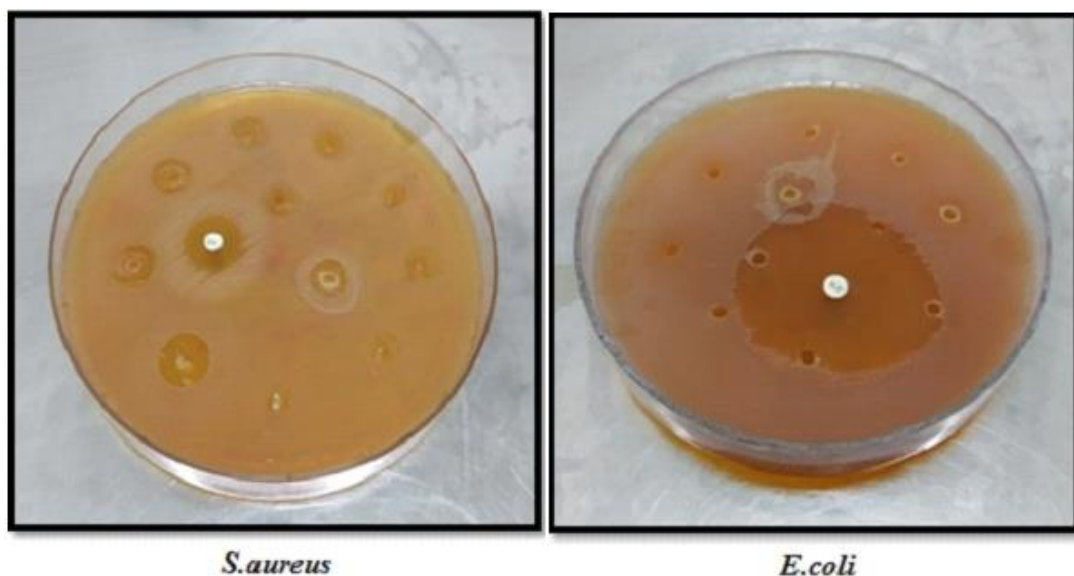


Fig 4.3 Antibacterial activity of *S.aureus* and *E.coli* Against substituted Chalcone respectively.

DISCUSSION:

The antibacterial activity of substituted chalcone was found to be against Gram positive bacteria (*S.aureus*). According to observation, its prominent zone of inhibition was found to be at 80 $\mu\text{g/ml}$ (17mm), 90 $\mu\text{g/ml}$ (18mm), 100 $\mu\text{g/ml}$ (20mm).

Hence, it has been demonstrated that **Thiophenemethoxy benzene chalcone** serve well against gram positive bacteria *S. aureus*.

However, antibacterial activity of Thiophenemethoxy benzene chalcone against **E. coli** cannot be seen.

CONCLUSION:

In the present study, we have demonstrated that a claisen – Schmidt condensation that offers a simple method for the synthesis of substituted Thiophenemethoxy benzene chalcone from methoxybenzaldehyde and 2–acetyl thiophene. The synthesised compound was well characterized by melting point determination, solubility profile, IR, mass spectrometry. There is growing interest in the synthesis of Thiophenemethoxy benzene chalcone because of the significant importance of these scaffolds in preparing a wide variety of biologically and pharmacologically active molecule. As synthesized compound were studied for their antibacterial activity for gram positive bacteria (*S.aureus*) at different concentrations besides these protein based study in progress and result are awaiting. This study concludes that Thiophenemethoxy benzene chalcone is superior for the application of antibacterial activity.

Chapter 7

Existence of Mathematics in day to day life

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Abstract: The majority of pupils appear to be having difficulty with the topic of maths. Actually, this topic gives individual's confidence in their ability to apply mathematics to their daily lives and to comprehend its fundamentals. Parents understand that their children know very little about how mathematics is used in everyday life. Therefore, the focus of this essay is on the value of mathematics in everyday life. The most prevalent and practical examples are given, including those involving computers, banking, finance, atmosphere analysis, games, and transportation, among others. Innovative uses of mathematics are also covered.

Keywords : Mathematics with examples in real life.

INTRODUCTION:

Our rational thinking grows thanks to maths. Today, mathematics is directly important in business, healthcare, banking, and defence technology, among other fields. Students must understand the significance of this subject in order for them to make connections between it and their daily activities. Therefore, it is imperative that maths professors take the effort to teach mathematics using relevant, everyday concepts. If this subject is taught officially, many pupils will experience difficulties. Students must clear their concepts about mathematics to apply it in real life via mathematical modeling and interrupt that through data analysis, which is always used in industry, societal issues etc. They should be able to understand and well explain the mathematical application in our surrounding.

Literature study

In this section, we discussed a few references that are based on fundamental concepts in mathematics and how they relate to daily life. According to Costu (2009), the top pupils were failing to use mathematics in practical situations. Day – to – Day life examples : -

Accounting: Every individual who works in a bank regularly handles big sums of money. Therefore, they must centrally record Debit - Credit and account balance.

Policy Formulation: Math is used to analyse data related to policies so that companies may reassure customers that their investments will be profitable if they choose a particular policy.

Loan: To grant any type of loan, including a house loan, a business loan, and a car loan. There is a risk involved with this bank releasing the money. In order to fulfil their loan and mortgage items, they thus utilise mathematical expertise in the form of software, and the bank can offer client advice.

Weather Prediction: To predict weather is one of the most difficult task but it makes easier because of the weather stations, satellites etc. The first step to define the atmosphere in temperature, pressure, humidity etc and then next is to determine the future stage through computations. It is very difficult to solve non – linear equation having various physical parameters. Hence , to solve such equation, we apply there numerical approach to find the solution.

Computers : Behind each and every technology there is mathematics . Computers is a gift for today’s generation. Google is itself a huge collection of knowledge. No one research scholar wish to do their research without computer. Theoretical computer science involves a lot of mathematics which deals with mathematical structure that are discrete rather continuous . Theoretical computer science involves a lot of mathematics in the form of graphs, algorithms, algebra, quantum computations, computations geometry and computational number theory . Computer operates on binary digits which is basically mathematics.

Math matters for computer science because it teaches students how to use abstract language, work with algorithms, self-analyze their computational thinking, and accurately modeling real-world solutions

Different Kinds of Math Used in Computer Science

- Binary Math
- College Algebra
- Statistics
- Calculus
- Discrete Math

Therefore Mathematics provides methods for organizing and structuring knowledge so that, when applied to technology, it allows scientists and engineers to produce systematic, reproducible, and transmittable knowledge. Mathematics is essential to modern technology. Because mathematics and technology are mutually dependent, this relationship is reciprocal. Mathematics today uses computers for more than just calculations. Members of the mathematical community rely on computers for conducting proofs, validating facts, and countering misconceptions.

In the way in which math is thought of, there is a fundamental significance. A brief summary of mathematics: Mathematics provides systematic, reproducible, and transferable ways to arrange and structure knowledge, which in turn allows scientists and engineers to produce technology.

Music : It is very interesting that how mathematics is used in music. We love to hear different different musics like classical, rock, folk , pop etc. The composers arrange notations and create different musics. So in this way maths is related with different nodes of musics.

Transportations : Transportation and logistics problems have itself a different application of mathematics. For example railway route, it requires planning to reach a particular destination where hyper-graph-theory involved. Air transportation based on discrete- mathematics.

Electrical and Electronic Engineering: Usage of mathematics in different flow of electrical and electronic engineering is outstanding by everybody. Numerous electrical and electronic engineering students think that it's hard to tackle electrical and electronic engineering problems which require mathematics a considerable measure. It is not possible to investigation of current, voltage, electric LR and RC circuit, electromagnetic fields, designing and analyzing circuits without utilization of scientific instruments of trigonometry, Calculus, Geometry and Differential Equation.

If you apply a voltage across a capacitor, it 'charges up' by storing the electrical charge as an electrical field inside the device. This means that while the voltage across the capacitor remains initially small, a large current flows. Later, the current flow is smaller because the capacity is filled, and the voltage raises across the device. Complex Analysis methods

are also important in electrical engineering in fields such as signal processing, power electronics, control systems, and others.

Construction: Civil engineers use mathematics equations to study the chemistry of materials to use the right material for the project. Engineers measure the strength of the material and apply chemical equations to judge the strength of the material. *Geometry is used to design with the best angles to make structures as strong as possible, using shape, size, position and other properties.*

Medical: Calculating drug doses relies on maths such as addition, fractions and algebraic equations, and these calculations are extremely important because a dose of medicine that would help an adult could be harmful to a child, whilst a child's dose might not be enough to help an adult.

Discussion

In this article, we have discussed a number of mathematical applications that relate to our everyday lives. Through this essay, teachers can pique students' attention to some extent, encouraging them to take part in mathematical competitions or activities like quizzes, puzzle games, or mathematical modeling. Students who adopt this way of thinking are more likely to succeed in technical careers. Mathematics professors in any applied area should find the basic examples we provided useful in finding instances in their environment.

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Chapter 7

Role of library online resources in knowledge and information

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Abstract

In the current paper, we discuss the "Information Age" and library electronic resources. Information is a wide, dynamic, and exhaustive source that influences all disciplines and has value, but that value comes from its dissemination and subsequent use. Information must be sent through a certain medium in order to be communicated. Libraries and information centres at educational and other institutions house crucial elements like information and knowledge. Additionally, libraries play a significant role in the quality of education. College libraries are among the largest units in a college and collect, process, and provide a wide range of reading materials, including reports, general books on important subjects, journals appropriate for the academic community, and organise services cooperatively to satisfy everyone's need for information.

Key Words: E-Resources, Advantages & Disadvantages.

INTRODUCTION

Due to the dramatic shift in user attitudes and the development of information technology, resource sharing via computerised networking is now necessary and unavoidable in college libraries. The current advancements in computer networks, bibliographic tools, and digitised picture transfer have improved the interlibrary lending program's possibilities. The development of the networking and environment necessary

for resource sharing, resource disclosure, reciprocal inquiry responses, and contingency planning will be entrusted to the participating libraries. In addition to above, internet is playing a very significant role in the resource sharing. The internet provides a whole host of advantages to users, authors, and publishers in terms of speed of publication, speed of access, wide distribution, sharing of information resources, feedback online and other. The internet has enabled global connectivity of computer and the development of various tools and techniques for networked information provision and access, E-mail, FTP, TELNET, USENET, and World Wide Web etc. are the examples. These tools have been used for providing access to a variety of scholarly information sources and tables of contents, pre-prints, technical reports, software and data archives, Library catalogues, reference sources etc. Networks among libraries serve co-operation by providing for the sharing and exchange of bibliographic and reference services and text. Document Delivery is a very important facility of the internet, which has given new meaning to the inter library loan service.

E-RESOURCES APPLICATIONS

The reasons for actually embarking on the purchasing of electronic resources are generally accepted because of the ease of usability, readability, affordability and accessibility. The following are the advantages of e-resources over the print media

- a) Multi-access: A networked product can provide multiple points of access at multiple pints round the clock and to multiples simultaneous users.
- b) Speed: An electronic resource is lot quicker to browse or search, to extract information from, and to integrate that information into other material and to cross-search or reference among the different publications.

- c) **Functionality:** E- resources will allow the user to approach the publications to analyze its content in new ways by clicking of the mouse on search mode.
- d) **Content:** The e-resources can contain a vast amount of information, but more importantly the material can consist of mixed media i.e. images, video, audio animation which could not be replaced in print.
- e) **Mobility**
- f) **Savings physical Space**
- g) **Convenience**
- h) **Saving time & money**

Network Assisted Resource Sharing in College Libraries

Now-a-days, resource sharing through computerized networking is essential and inevitable in the college libraries due to tremendous change in attitude of the users and information technology. The recent developments in computer networks, bibliographic utilities and digitized transmission of images have enhanced the capabilities of inter library lending program. The resource sharing will depend upon the participating libraries to develop their networking and environment like resource to share, reveal the resources, response to query reciprocity and reckon with all eventualities.

In addition to above, internet is playing a very significant role in the resource sharing. The internet provides a whole host of advantages to users, authors, and publishers in terms of speed of publication, speed of access, wide distribution, sharing of information resources, feedback online and other. The internet has enabled global connectivity of computer and the development of various tools and techniques for networked information provision and access, E-mail, FTP, TELNET, USENET, and World Wide Web etc. are the examples. These tools have been used for providing access to a variety of scholarly

information sources and tables of contents, pre-prints, technical reports, software and data archives, Library catalogues, reference sources etc. Networks among libraries serve co-operation by providing for the sharing and exchange of bibliographic and reference services and text. Document Delivery is a very important facility of the internet, which has given new meaning to the inter library loan service.

Offering Digitized Information through Electronic Media

Once libraries and their user are electronically linked through networks, libraries can provide electronic reference services. The college libraries should use the digital technologies to digitize their documents and other materials to provide digitized information. The digitized information can be transmitted and received anywhere in the world where the infrastructure to send and receive is place. Digital materials can be available to user anywhere and at any time. They can be used simultaneously by more than one person.

Resource sharing is necessary that the libraries develop some rational and mutually benefited guidelines for the procurement of various kinds and types of learning resources and such an approach will minimize duplication of work on the one hand and ensure comprehensive coverage on the other. At present majority of Indian users (in the field of education) have access to internet through various networks, and also libraries using internet can provide better information services much wider in scope at minimum cost and time. Reference sources like encyclopedia, dictionaries, directories, bibliographies, indexes, abstracts, maps etc. are available with up-to-date information on networking.

Technological Change and Information Use

There is overwhelming consensus concerning trends in unit costs in information technology: The cost of computing power will continue to decrease rapidly; Data storage costs will continue to decrease steadily; and the technology

of telecommunications indicates strong long-term reductions. Software, being labor-intensive to develop and maintain, should not be assumed to share in the dramatic improvements in hardware costs. Nevertheless the overall trends are very clear: Computer-based operations are becoming steadily and substantially more affordable.

Information technology may only be means and not an end, but that does not make it unimportant. It may be noted that in the provision of library service a very large proportion of present budgets is devoted to arranging the means to enable service to be provided. The substitution of computing power, electronic data storage, and use of telecommunications holds considerable potential, not least because of the expectation that they will continue to become how and when the substitution of procedures based on new information technology should be adopted. The constraints include our limited ability to determine how to achieve that substitution, when that substitution will become cost-effective and, at least as important how to discriminate between substitutions that support improved library service and substitutions that subvert the mission and role of library service.

Electronic Library and Communication of Information

Now-a-days, several libraries can share the resources through network system. Electronic library used directly by clients without the intervention of librarian which is very advantageous and by this communication is made quickly. Message can be sent or received in the form of audio-visual system such as text, graphs, photos and sound etc. It is more economical and avoids duplication of work and easy to facilitate in sending information or share the information. Therefore, the present information society prefers electronic and optical media for storage and retrieval. CD-ROM is an optical media though it is part and partial electronic information industry. It is a convenient and viable media for sharing the network resources. The optical media is widely used for compact storage and

speedy dissemination of information. CD-ROM data bases help the libraries is providing full address to the vast information without ownership of all of the information sources. The uses of CD-ROM include but are not limited to save time and money and avoid duplication of work. It is more useful for research and improving knowledge and teaching learning process in the colleges. In view of the above, it is necessary for the institutions that a more cost-effective way be devised for easier dissipation of the information amongst its users. One such approach could be to use the digitized information resources.

Internet and E-Resources

As more resources are created via the web, issues arise related to search & access the same. Users would like to see their library on the internet, able to meet their all information needs not only on demand but also in anticipation of demand. Besides this they would also expect to get comprehensive information on broader range of disciplines while a engineering college library could have good collection only in their specific discipline. Again it would be a big cause of users dissatisfaction. But to overcome this problem engineering college libraries may have to have more & more electronic resources which shall help to offer new and more qualitative services to their users.

E-Resource or Electronic Resources is one of the emerging environment in libraries & Information communication in the competitive service. E-Resources usually consist of e-books, e-Journals, articles, newspaper, thesis, dissertation, databases and CDROMs, which are likely to be the alternative to the print media. Emerald, Ebsco, Scopus are some of the examples of online databases. All updated information is published in these e-resources. The familiarity and use of electronic information resources in the libraries for rapid development is necessary and important

DIGITAL RESOURCES

A digital resource can be defined as any resource, which is available in digitized form. They can include a variety of materials such as : (i) complete contents of document in machine readable form (ii) scanned images (iii) CD-ROMs (iv) databases access through internet or other networks (v) metadata and digital audio/video clippings or full movies etc. In the present age of information technology, the libraries are bound to procure them because of following reasons:

- (i) Evolution and proliferation of information technology.
- (ii) Changes in publishing trend – publishers are inclined towards electronic publishing.
- (iii) Information explosion through improving digital technology, attempts can be made to achieve bibliographic control over important and useful conventional information sources in science and technology and even social sciences.
- (iv) Financial constraints on the part of all kinds of libraries.
- (v) Growing popularity of World Wide Web and Overall realization of utility of electronic technology in every sphere of knowledge.
- (vi) Tremendous growth of CD-ROM products etc.

The selection and acquisition of digital resources is a tough task. In acquiring them in a library, the following points are to be kept in view :

- (i) The conventional collection development criteria should be paramount and are to be applied consistently across formats including digital resources, which include :
 - a. Establishing a coherent rationale for the acquisition of each resource.
 - b. Meeting faculty and student information needs, and providing orderly access,
 - c. Preparing guidelines to the digital resources and integrating them into library service programs and;

- d. Ensuring that the advantages of the digital resources are significant enough to justify its selection in digital format.
- (ii) The priority should be given to digital format acquisition of those resources, which are beneficial to most of the faculties and the students.
- (iii) The priority should also be given to digital resources when they offer significant added value over print equivalent in such ways as : more timely availability, more extensive content and greater access.
- (iv) A digital collection must contain a sufficient critical mass to evaluate its utility and to justify its selection

Whereas, in selection a digital resource for a library, following levels of review are to be seen.

- (i) Is the content appropriate to the library mission?
- (ii) Are the format and information delivery medium appropriate to the content and with the rationale for resources acquiring?
- (iii) Is the acquisition practicable with in the existing budgetary, technical, legal and other constraints?
- (iv) Are the resources compatible with the library's overall strategic digital library vision and current infrastructure?

As far as the preservation is concerned, it is enduring the long-term access to the digital documents. Unlike the print publications, the digital preservation is more complex and many aspects are to be taken for consideration, such as contents, presentation, functionality and authenticity etc. of the resources. It is advisable to keep following criteria in mind while going for digital preservation. Most importantly, preservation of digital resources to should be done at different levels depending on its usability and functionalities. Continuous reviewing of the digital resources for ensuring long term access to them, and weeding out obsolete

information and invalid websites, when access in online. The preservation of digital resources is possible in following ways:

- (i) The Older technology can be preserved for viewing digital objects in their original formats but it is not feasible in long term due to cost, space and technical support requirements, e.g. the Hardware.
- (ii) Some digital resources are highly dependent on particular hardware or software, for such resources, emulation techniques are used for long term access.
- (iii) Data migration technique can also be sought, which cover a wide range of activities to periodically copy, convert or transfer digital information from a medium that is becoming obsolete or physically deteriorating to a newer one (e.g., floppy disk to CD-ROM), and or converting form one format to another, and/or moving documents from one platform to another. Through migration the preservation of physical presence and the content of the digital object can certainly be done. However, it may not preserve presentation, functionality and the context.

In avoiding such duplication of efforts and resources, many libraries are now switching over to partnership, i.e. a kind of resource sharing of old aspect. This is what constitutes a library consortium. So, it would not be wiser or cost-effective to duplicate information resources among the libraries rather than to cooperative purchase option through consortia purchase and provide wide access to information resources over the internet.

Different groups throughout the world have formed various consortia. Many international and national consortia of various types are working in the field of library science. To name few on national level are:

- (i) Science Direct-Elsevier
- (ii) Gale Group-A Thomson Company

- (iii) Consortium for IITs and IIMs
- (iv) J-Gate-the e-Journals Gateway and
- (v) UGC-INFONET : E-Journals Consortium

UGC-INFONET is the largest emerging library consortium, which is funded by the University Grants Commission and is being executed by INFLIBNET Centre, and Inter-University Centre of UGC at Ahmadabad. All universities come under the preview of UGC and are being covered under this consortium. This consortium is the result of better understanding and cooperation between the UGC and ERNET (Education and Research Network), the Inter-University Centres IUCAA, CEC, INFLIBNET and the national and international publishers.

The literature made available on this consortium includes, journals, covering research articles reviews and abstracting databases. The access to current as well as to archival literature is provided. This program aims at covering all fields of learning of relevance to various universities including:

- (i) Arts, Humanities and Social Sciences
- (ii) Physical and Chemical Sciences
- (iii) Life Sciences and
- (iv) Computer Sciences, Mathematics and the Statistics etc.

ELECTRONIC DOCUMENTS

E – Resources are now emerging as vital source of information for all recent and emerging thoughts and ideas coming into existence in whatever area of research. Emergence of internet and World Wide Web has provided a platform to display these resources globally. The features inbuilt in the search and retrieval of these resources have made the usage to the maximum. Information and Communication Technology (ICT) has a major impact on materials for search. ICT can provide the enhanced forms of research resources, as e-resources' and is changing the shape of

both the primary resources like texts, images and data, and secondary resources like catalogues. Libraries are subscribed to various bibliographic and full text databases which are of interest to the users.

The Characteristics of electronic documents:

- Electronic documents are not localized. Given telecommunication connections, an electronic document can be used from anywhere, without one even knowing where it is stored geographically.
- In practice several people can use the same database or electronic records at the same time.
- Electronic documents are easily copied.
- Documents stored electronically are very flexible. They are easy to revise, rearrange, reformat, and combine with other documents. Hence the popularity of word-processing among people who have to create and, more especially, revise documents.
- Collection of documents stored in electronic form is less bulky than paper versions.

Libraries have changed its face with the emergence of ICT. They have assumed the role of educators, train the users to find, evaluate and the usage of information in the library and also through electronic networks. Libraries have been using ICT in general and computer technology in particular, to automate a wide ranges of administrative and technical processes and provide better services to their users. ICT has helped the library and information science professionals in conquering space and time and rendered it possible to retrieve information from any corner of the world instantaneously and provide it to the users efficiently and effectively.

In an age of information explosion, ICT is progressively replacing the old methods of information collection, storage and retrieval. Academic Library

System is a major beneficiary of ICT. Information is knowledge, facts or data. For the purpose of enabling the users to assimilate information, it should be repacked. Knowledge becomes information when it is externalized i.e., put into the process of communication. The effectiveness of communication technology depends how well it provides its clients with information rapidly, economically and authentically. A large number of ICT enabled service including OPAC. E-resources, etc. are available in the academic library.

An e-library or Digital library is a physical site and/ or website that provide around the clock online access to digitized audio, video, and written material. It provides free copies of books, journals etc. available to the users. Normally these materials are classics which have no copyright digital formats (as opposed to print, microform, or other media) and accessible by computers. The digital content may be stored locally, or accessed remotely via computer networks. A digital library is a type of information retrieval system. Digital Libraries are increasingly popular research area that encompasses more than traditional information retrieval or database methods and techniques. There are many numbers of definitions.

An e- library is the electronic information, library organizers usage of catalog, tag and search books and journals. It maintains a database as the collection of e-materials and provides services in digital form. Many libraries traditionally have been repositories of local information and heritage document such as manuscripts, rare books, maps, photographs and paintings, etc. In university libraries, documents generated in-house such as dissertation and theses, research reports etc. represents the intellectual strength of the institution. Libraries are developing digital repositories of such resourced and providing access to internet or intranet access to these. Large public and academic libraries also provide up to date local information via internet. Digital libraries are a natural progression from electronic document sharing. The main benefit of digital library

is the ability to provide around the clock, remote access to high demand or restricted materials for multiple concurrent users. Setting up a digital library can either be done by using ‘off-the-shelf’ digital library products, document management products or library management products capable of digital library management or in-house system development by using open archives software.

E- JOURNALS

Electronic issues of journals and articles to periodicals the library subscribes in. It consists of Full-text and Bibliographic Databases. An e-database is an organized collection of information. It supports flexible and in-depth searching of different fields, e.g. journal title, article title, author, abstract, year, etc. We can only search for journal title in the Library Catalogues, but not the title or author of individual articles. Therefore, e-database is extremely useful to find out the articles on particular topics, e.g. Peer assessment in classroom.

E- BOOK

Any library is to provide quality information services for complete user satisfaction through optimum utilization of the resources the library has. In order to achieve this goal libraries acquire, preserve and disseminate the documentary as well as the non-documentary records of information. In earlier days, the library documents were mostly in the form of “traditional” books with a designated format, i.e. a physically distinct creation made up of a collection of pages and presented in a bound volume. Recent information handling technologies have significantly influenced the basic nature of traditional print-based libraries and have created electronic, digital and virtual libraries containing electronic documents like e-books, e-journals, etc. It can be said that there is a need to formulate a workable and sustainable strategy in Academic Libraries. It also urgently needs that systematic efforts are taken to develop suitable information infrastructure for providing access to e-books. E-books are preferred by the users

for their features like portability, upgradeability, note making, citation, changeable font size, references, links to other relevant sites, searching, etc.

ON-LINE DATABASES

Information organized and stored in a database, with structured cross-document search and retrieval, relational data structured, efficient query mechanisms. On-line search access to databases has generated the concept of libraries because the literature reported in the on-line searches is scattered in many libraries. The libraries instead of acquiring everything on their subject field, will depend more on the network of which they will form a part and share the resources among themselves.

WEBSITES

A URL could be as simple as a library web page listing the services with some links to catalogue and external free and subscribed resources or may include advance features like interactive helps and value added services such as subject gateways, self-help tools and frequently asked questions, and information about the library such as timings, calendar, rules etc can be hosted on the library web site a part from the ICT enabled conventional services. Web pages are the presentation of information which can be presented in a carefully chosen media most appropriately. Web pages can be static or dynamic, meaning that the content is the same each time someone visits the webpage or is taken from a database which is updated with new content. The specific objectives of library websites can be to

- To promote the library usage
- Provide information about the library and its activities
- Provide online access to local information sources
- Act as a gateway to the networked information resources (CDROM, Intranet / Intranet)
- Integrate Push-based services.

OPAC and WEB PAC:

Remote access to the Library catalogues was possible only through a telnet connection before the Web was launched. The web-based interfaces are now available for most of the integrated library software packages including Library. The users can click complex subjects instead of typing them or remembering complex commands.

INFORMATION ALERTING

As the name implies, information alerting services or Current Awareness Services are produced by the libraries for their users to alert them about new developments in a given field of study. Information alerting services are issues periodically by the libraries either for internal distribution amongst staff and employees or externally to other users. It may also consist of recent additions of books and other documents in the library for a specified time period.

DIGITAL REFERENCE

Reference service and imparting instructional training to the library users are key areas of activities for any library. The technology now allows reference librarians to reach out to the users using the network instead of waiting at the reference desk for users to come by. Besides, imparting instructions on mechanisms of using a library, a reference librarian is also involved in delivering reference service that require deep intellectual understanding of subject. Although automated libraries are not yet sufficiently advanced to offer interactive reference services, electronically-mediated reference services are increasingly available through libraries and information centres.

LIBRARY CHAT ROOM

Several libraries have started experimenting with offering real time digital reference service, using chat software, live interactive communication activities, call counter management software, web contact software, bulletin board services,

interactive customer assistance system or related technologies. Many libraries are experimenting with Internet chat technology as an innovative method to extend and enhance traditional and remote reference service. The librarian can conduct Internet searches and push websites onto the patron's browser, and can receive immediate feedback from the patron as to whether his or her question has been answered to his satisfaction. Most libraries currently involved in real-time reference service are part of a collaborative network so that they can share staffing and work around the clock to truly provide reference service any time.

E-RESOURCES DISADVANTAGES

Now, more and more people prefer e-resources to traditional ones, because it can save their time and money. However, with various e-resources flooded in, more and more people are aware of the disadvantages of e-resources.

- a) The fact that, e-resources require special devices or personal computers can be looked as a disadvantage. Many e-resources are typically produced to be compatible for certain software which in turn may be not easily available. Since e-resources are dependent on other equipments, certain hardware or software failure may affect it. Unless the hardware, Internet connection or battery power that is required by an e-resource reader is readily available, then its electronic document is useless. In addition, e-resources depending on hardware and software and are more easily damaged than a printed book.
- b) E-resource reading devices are surely more expensive than printed books. All devices of e-resources require power. There is a growing concern that the e-resources at present may not be accessible or compatible to the future's e-resources software or devices.
- c) Screen glare and eyestrain are a serious concern for many potential users of e-resource technology. A major worry of reading from an e-resource reader

could hurt the eyes. The display resolution of computer screens and electronic devices is considerably less than the print quality produced by a printing press.

- d) Reading from a computer lacks the familiarity and comfort of reading from a book. A paper book can be opened and flipped; through, while an electronic text is more difficult to navigate.
- e) E- Resources have unreliable life span. Paper has a much longer life span than most digital forms of storage. Because of the rapid development of new computer systems it is difficult to judge whether the software or hardware will become outdated. As new hardware is developed, structures must be put into place to allow for the migration of existing materials to the new platforms so that they can still be accessed. Methods of preserving the electronic document must also be developed. A high degree of reliability of the equipment must be a part of the electronic devices that handle the replacements for printed books.
- f) Many titles that are available in traditional print books are not yet available in an electronic book format.
- g) New technologies always require time, experience, and money in order to take full advantage of its capabilities.

Conclusion:

Electronic Resources is one of the emerging environment in libraries & Information communication in the competitive service. E-Resources usually consist of e-books, e-Journals, articles, newspaper, thesis, dissertation, databases and CD-ROMs, which are likely to be the alternative to the print media. Emerald, Ebsco, Scopus are some of the examples of online databases. All updated information is published in these e-resources.

The familiarity and use of electronic information resources in the libraries for rapid development is necessary and important.

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Chapter 9

Stress and Burn out are the exam valedictories to the students

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Abstract

The state that develops when a problem is applied to an organism is called a state. It is brought on by external and internal demands known as stéssos in people. Stesses can be external, come from work, can be internal, started by psychological stain and self-obligation. Twenty-five (n=45) engineering students from various schools in the Wadha district of Maharashtra State (India) who were exposed to various examination standards were chosen for experimentation purposes. These students were aged twenty to twenty-two years. Biochemical parameters such as serum cholesterol, triglyceides, total lipids, and serum cortisol were estimated in these students. Serum cholesterol, triglycerides, total lipids, and serum cortisol all showed a significant tendency to change with the degree of assessment standards. Values for each of these parameters reached a control level after the test was finished. Since cortisol was a significant stress hormone, it appears that the change in serum cholesterol, triglycerides, and total lipid levels at the time of the exam in students was caused by stress-induced changes in cortisol levels.

Key woíds: Examination stéss, séium cholestéíol, tíglyceídes, total lipids, séium córtisol.

INTRODUCTION

Students must learn how to manage their exam anxiety in order to prepare effectively for the test and perform at their best on the day of the exam. Exam anxiety is something that everyone experiences during the exam preparation process. As a highly adaptive phenomena in humans, stress contributes to a person's survival, activity, and performance in today's world across all spheres of life (Pades and Homa, 2006). According to Loft et al. (2007), academic test stress is thought to significantly affect students' wellbeing. Professional career, social status and their self-esteem (Lazarus, 1966) of some students examinations are: stress inducing events (Folkman and Lazarus, 1985). The stress among students is expressed through its effects on learning (Yeikies, 1908). Although some students may face psychiatric problems like inability to do school work and the fear of academic failure (Ellis, 1969), the influence of various forms of stress on cholesterol level is of increasing interest and importance today.

Numerous studies have discovered that during times of stress, cholesterol levels are noticeably higher than they are at other times (Fiedmann, 1958; Wetlake et al., 1958). Mental stress is one of the factors that has been haphazardly related to high blood pressure. The biochemical features reflecting the severity of hypercholesterolemia and serum cholesterol levels are now acknowledged as a significant risk factor in coronary atherosclerosis. There have only been a few studies proving a connection between mental stress and serum lipid profile. Examination of stress is quite a well documented fact. Therefore the present study aimed at investigating the changes in lipid level and serum cortisol level during examination stress in college going (polytechnique) students. Stress causing factors such as teacher's quality , selection of course /faculty, participation in other

activities, participation in household works, feeling of irritation, study time adequacy, concentration in studies, patient satisfaction with educational performance of students, Fear of any subject Satisfaction with education Availability of facilities, meeting patient expectations etc.

Materials and Methods

Twenty-five (n=55) Polytechnique students between the ages of 18 and 22 were chosen for the study. They all come from households in the middle socioeconomic level. Each student was asked questions in order to assess their quality of life and collect samples later (Peshad et al., 1985). The first batch of samples was taken two months before the test when students were occupied with campus cultural competitions that served as a form of control. The second batch of samples was taken two days prior to the start of the test and was taken as seriously as the test itself. The third set of sample was drawn two days before professional examination and it serve as pre professional. The fourth set of sample was drawn after professional examination and it served as post professional examination sample. The level of stress was measured by various physiological parameters like serum cholesterol, serum triglycerides serum lipids and serum cortisol Serum cholesterol was estimated by the method of Ireland J. L. (1941), Serum Triglycerides was estimated by method of Fossati and Pincipe (1982) and total lipids were estimated by National Cholesterol Program NCEP (Friedwald et al. 1972). The cortisol was estimated by RIA method. The mean of the difference of the values obtained at four occasions were calculated and statistically analyzed by utilizing the paired student's t test.

Results and Discussion

Serum cholesterol, lipids, triglycerides, and cortisol levels of 45 engineering students were measured in the current study on four separate occasions (during the college, professional, and post-professional phases). In the most recent study, it was shown that serum cholesterol, triglycerides, lipids, and cortisol considerably decreased before to a physical examination and showed a further decrease prior to a professional assessment. The mean of difference of these values was highly significant ($P < 0.001$). The increased levels of serum cholesterol, serum triglycerides, serum lipids and serum cortisol turned to control level after the examination stress was over (Table 1) However this difference in these physiological parameters between control and post professional values

was not statistically significant ($P > 0.05$). These rising levels returned to normal after examination stress was over (Post professional period, $P > 0.05$). Similar findings were reported by Weillake et al. (1958) and Pinessneí et al., (2003), examination stress were associated with elevated basal cortisol level, which ultimately rise to serum cholesterol, serum triglycerides and total lipid levels. There was also evidence ($p < 0.001$) to conclude that serum cortisol were significantly increased at the time of stress (Quíeshi et al., 2009). Similar findings were reported by Friedmann et al., (1958) who stated that examination stress produces changes in serum cholesterol and serum cortisol. There is also strong evidence that the effect of hormones on lipid metabolism has been implicated and claimed (Patterson et al., 1993).

Chronic stress can contribute to several harmful physiological events due to release of cortisol in response to stress (Ely, 1995; McEwen, 1980; Vicennati et al., 2002; Walleíus et al., 2003). In addition, high blood pressure, elevated lipids, and

hyperglycemia with elevated glucose level had been linked to elevated cortisol level. Romeo and Butley , (2007) stated that the primary steroids released in response to stress are the glucocorticoids like cortisol and corticosterone

The classic effect of glucocorticoids increase blood glucose by converting protein to glycogen thereby by indirectly increasing glycogen breakdown in glucose by Epinephrine and Noradrenaline and by stimulating the catabolism of protein to form new glucose in a process called gluconeogenesis. The glucocorticoids reduce the uptake of blood glucose by target tissue resulting in higher blood glucose concentration available to tissues involved in responding to stress. Glucocorticoids do this by stimulating the internalization of glucose utilization, the sum of which across multiple target tissues results in higher blood glucose concentration. Tissues that need extra glucose in response to the stressor compensate for the glucocorticoids effect and essentially have preferential access to the increased pool of blood glucose. Our findings were also similar to these results.

The previous literature indicates that the cortisol levels are strongly affected by the stress

Anorexia nervosa may be associated with increase in cortisol level (Field et al., 2005). The most common cause of mortality and disability in industrialised countries continues to be cardiovascular disease. According to epidemiological statistics, poor nutrition, inactivity, smoking, obesity, SS, and pollution all increased the risk of developing coronary heart disease. Agawal et al. (1997) looked at the impact of stress on G Level and C when under stress. The results show that the serum G level in the stressed situation decreased considerably (p 0.05). The increase in serum triglyceride levels may be caused by peripheral lipolysis under the action of hormones. Previous research have looked at the relationship between G, C, and stuttering (Belic et al., 1998;

Mancas et al., 2008; Fan et al., 2010). The incidence of coronary heart disease has shown an increase during past few years. Considerable evidence has now been accumulated indicating that rise in serum cholesterol and serum cortisol is closely linked with stress and this rise is a risk factor of coronary artery disease. Chronic stress can contribute to several harmful physiological events. There is also strong evidence that during Fasting, awakening, and psychosocial stress body releases cortisol (Ely 1995, Vicennati et al., 2002 and Walleijuset al., 2002). In addition high blood pressure, elevated lipids, and hyperglycemia elevated glucose have been linked to elevated cortisol levels (Andrews et al., 2002, Maffeni et al., 2002)

Every person has his own optimal level of worry and anxiety, which helps him/ her to achieve the best results. The individual must learn how to control the stress and extra anxiety, stated that there is definite relationship between mental, emotional stress, serum cholesterol levels and serum cortisol level.

Suggestion and Recommendation

The approach of parents about their growing child should more friendly. The advice to the children of today is that they have the faith that they can lead a fruitful and happy life. It is important that they contribute something to the community. They should understand that stress is also the part of life and how we handle stress is what makes a successful. There is no place in our system for creativity, learning ability or personality development. They should learn life and social skills in school or colleges how to cope with life, unfortunately it is not done.

Condition	Seíum Cholesteí ol(mg/dl)	Seíum Líglyceíid es (mg/dl)	Seíum Lipids (mg/dl)	Seíum Coítisol (mg/dl)
Contíol	156.82 ± 4.13	72.18 ± 8.69	422.24 ± 18.18	12..23 ± 95
Píe teíminal	170.27± 7.46	78.26 ± 8.99	428.14 ± 18.16	19.73 ± 3.76
Píe píofessional	178.48 ± 6.09	89.07 ± 7.55	450.14 ± 19.16	26.82 ± 3.76
Post píofessional	147.89 ± 6.97	65.72 ± 9.95	419.34 ± 19.29	11.68 ± 4.98

Significant at P> 0.05, mean ± SD

Table no. 1- levels of seíum cholesteíol, tíglyceíides, lipids and seíum of engineering student at diffeíent stíess condition (n= 55).

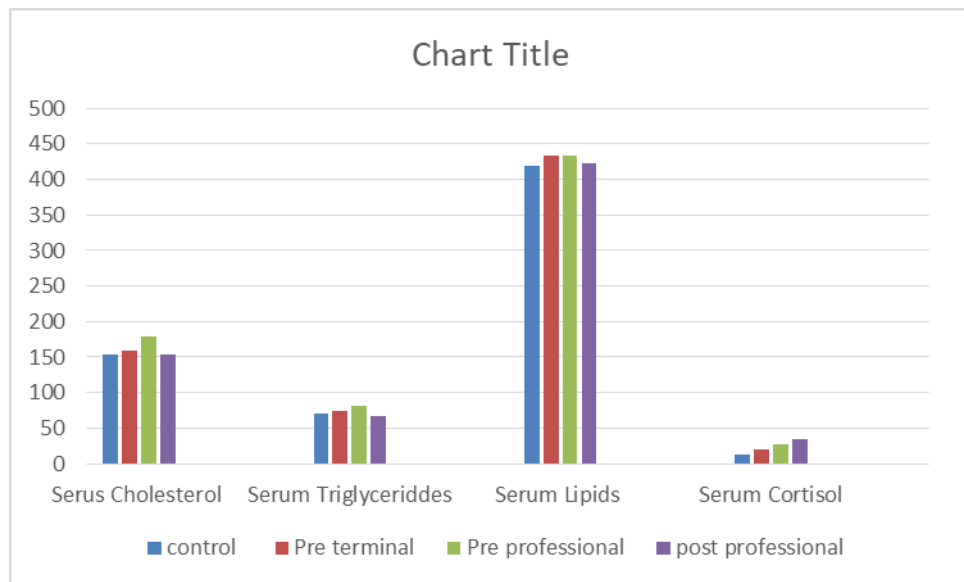


FIG. 1 Shows a level of seíum cholesteíol ,seíum tíglyceíide ,seíum lipids and

seúm cóitisol was significantly higher in pre terminal and pre professional condition than control and post professional.

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