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Experimental Pharmacology Series

What is Experimental Pharmacology (Ex-Pharm) Series

This is a computer assisted learning (CAL) software containing various programs which simulate animal experiments in Pharmacology. These programs can be used to demonstrate effect of drugs on different animals systems. The package is user friendly, highly interactive and full of animated sequences which make simulation appear realistic. The current version of Experimental Pharmacology (Ex-Pharm) Series Software consists of following computer simulated experiments:

Experiments List

01. Experiment on effects of various drugs (Mydriatic, Miotic and Local Anaesthetic) on rabbit's eye.
    - Epinephrine
    - Atropine
    - Ephedrine
    - Physostigmine
    - Lignocaine
02. Study of Analgesic activity with the help of "Tail Flick Apparatus" (Analgesiometer).
03. Study of Analgesic activity with the help of "Hot Plate Apparatus" (Analgesiometer).
04. To study analgesic activity by writhing test.
05. Study of Antihistaminic drugs/Anti allergic drugs by mast cell stabilization method with help of "Histamine Chamber"
06. Study of Muscle Relaxant activity with the help of "Rota-Rod Apparatus".
07 Study of CNS Depressants & Stimulants Using "Actophotometer".
08. Study of Drugs acting on CNS (Including Anxiolytic Activity) using following modules
    - Elevated Plus Maze Method
    - Pole Climbing Method
09. Study of anticonvulsant activity using "Electro Convulsiometer".
10. To study PTZ induced convulsions in mice
11. Study of effect of hepatic microsomal enzyme inducers on the phenobarbitone sleeping time in mice.
12. To study the action of strychnine/ anaesthetic on frog neurons (excitability).
13. Simulation of pupil control
    - Simulation of the effects of the physiological stimuli and drugs on the papillary reflexes.
    - Simulation of the control in patient with partial parasymathectomy.
14. Test for pyrogens using rabbits.
15. Effect of drugs on isolated guinea pig ileum (in-vitro).
16. To study respiratory depression effect on rabbit.
17. Study of stereotype and anti-catatonic activity of drugs on mice.
18. Experiments on thyroid and antithyroid drugs
    - The effect of thyroxin, TSH, propylthiouracil, on metabolism.
19. Experiments on blood sugar
    - The effect of insulin (hypoglycemic activity) and alloxan on blood glucose.
20. Study of anti-inflammatory activity using carrageenan induced paw oedema method
21. Study of diuretic activity using metabolic cage
22. Experiment on Effect of various drugs on Isolated Frog's Heart. (DRC- Dose Response Curve)
    - Epinephrine
    - Norepinephrine
    - Isopreneline
    - Calcium Chloride
    - Prapanolol
    - Actyelcholine
    - Potassium chloride
    - Atropine sulphate
23. Experiments on effect of different drugs on dog BP & heart rate.
    1. Virtual Practice- Effects of drugs on the dog BP and Heart Rate.
    2. Effects of Vasopressor and Vasodepressor with appropriate blockers.
       a. Virtual Practice- Reversal action of adrenaline on blood pressure and heart rate.
       b. Virtual Practice- Reversal action of acetylcholine on blood pressure and heart rate.
24. Experiments on Lagendorff's Apparatus
    - Effect of coronary vasodilators on isolated heart
    - Effect of parasympathomimetics
25. Experiment on Bioassay of Histamine on the Ileum of Guinea Pig.
26. Bioassay of Acetylcholine on the isolated rectus abdominis muscle of frog
    (a) By Matching Method, (b) By Interpolation Method,
    (c) By 3 Point Method, (d) By 4 Point Method.
27. Bioassay of oxytocin on the isolated rat uterine horn by following methods
    (-
28. Bioassay of serotonin on the isolated rat fundus strip by following methods
    (a) By Matching Method, (b) By Interpolation Method,
    (c) By 3 Point Method, (d) By 4 Point Method.
29. To record the DRC and to determine the PD2 value for acetylcholine on frog rectus abdominis muscle.
30. Study of anti-ulcer activity - using pylorus ligation method.
31. Evaluation of effect of acetylcholine (spasmogens) using rabbit jejunum
32. Evaluation of effect of different drugs on ciliary motility.
33. Evaluation of effect of saline purgatives on frog intestine.
34. Determination of acute irritation of a test substance.
    - Skin irritation (Including edema formation)
    - Eye irritation

For whom is the software?

Software is aimed for medical, pharmacy, ayurveda, veterinary and dental science students. The software can also be used by the students of paramedical courses such as nursing, medical laboratory technology and physiotherapy etc.

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INDEX

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JOHP

Budd Chiari Syndrome with seizure disorder: A case Report

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Abstract

Budd Chiari syndrome is an extremely rare hepatic disorder characterised by occlusion of the hepatic veins. This study is of a female patient having Budd-Chiari syndrome. She also had seizure disorder and hepatic encephalopathy. She presented with ascitis, jaundice, hepatomegaly and pedal edema with bleeding from foot ulcer. Laboratory investigations showed abnormalities in blood panel, coagulation profile and liver function test. Data supporting the diagnosis was obtained from USG and Doppler study reports. Additional findings included decompensated chronic liver disease, pulmonary hypertension, intracranial haemorrhage, right leg cellulitis and anaemia. She was treated for bleeding and liver protectants were given. She underwent sclerotherapy for leg ulceration. However she succumbed to death after a cardiac arrest, inspite of following the Advanced Cardiovascular Life Support protocol.

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Introduction

Budd-Chiari syndrome (BCS) is an uncommon disorder occurring in one in a million. It is characterised by obstruction (thrombotic or non-thrombotic) of the hepatic outflow tract, anywhere from the hepatic venules to the right atrium [1]. Patients commonly present with abdominal pain, ascites, jaundice, hepatomegaly, encephalopathy, pedal edema,stasis ulcerations and gastrointestinal bleeding [2].Laboratory studies are likely to show abnormalities in blood panel, liver and kidney function [3] and altered coagulation, which helps in predicting the severity of disease while imaging studies may illustrate the venous obstruction [4]. Management comprises of several medical, endovascular and surgical procedures [5]. The following case is of a patient with BCS along with hepatic encephalopathy, decompensated chronic liver disease (DCLD) with portal hypertension and seizure disorder.

Case Presentation

A female patient of age 33 years was admitted in the Emergency Department (ED) with complaints of bleeding from right foot ulcer since 3 days and decreased responsiveness. Five years earlier, she had been diagnosed with Budd Chiari syndrome (BCS), decompensated chronic liver disease (DCLD) with portal hypertension and hepatic encephalopathy. She also had a history of cerebrovascular accident (CVA) with intra-cranial haemorrhage (ICH), and seizure disorder.

On physical examination, the patient was unresponsive, disoriented, afebrile, pale and icteric with bilateral pedal edema. Her vital signs showed that blood pressure was not high (130/70 mmHg), heart rate was 100 beats/min and respiratory rate was 22 breaths/min. SPO_2 was 99% on 4 litres of oxygen. Her abdomen was soft, distended and ascites was felt.Since the patient was unstable and had a low GCS (8/15), she was shifted to the ICU.There she underwent sub-clavian central line placement and was intubated with Synchronised Intermittent Mandatory Ventilation (SIMV). Covid-19 was found to be negative following RT-PCR test. Oxygen level (SPO_2) was maintained at 98%-99%. The total intake was 1250 ml and the total output was not measuredsince she was on diaper. The output through Ryles tube was 50 ml.

Investigations

On day one, sysmex count of the patient showed low haemoglobin (6.9 g/dL) and anhematocrit (HCT) of 23.1%, indicating anemia. Mean corpuscular volume (MCV) (95.1%) and mean corpuscular haemoglobin (MCH) (28.4%) were normal but mean corpuscular haemoglobin concentration (MCHC) was low at 29.9% suggesting iron-deficiency anemia. The patient was administered 4 pint PRBC. Platelet count was drastically low at 21,000 cells/mm^3. Other values were red-cell distribution width: RDW-SD 65 fL; RDW-CV19.7%; polymorphs 93.2%; lymphocytes 3.4%; monocytes 3.3%; eosinophils 0% and basophils 0.1%. The report showed bicytopenia, normocytic normochromic blood picture with few hypochromic cells, polychromatic cells, burr cells, acanthocytes, spherocytes 1%, few RBS agglutinates, fragmented RBCs 3%, relative neutrophilia, severe thrombocytopenia, small aggregates and an immature platelet fraction of 6.7%. The random blood sugar (RBS) was 189 mg/dl. The TSH was within normal limits (1.71 mIU/L). The coagulation profile showed an elevated prothrombin time (PT) (25 sec) and international normalized ratio (INR) (1.88). Electrolyte levels showed normal potassium (4.1 mEq/L); decreased sodium (128 mEq/L); elevated chloride (108 mEq/L); and a low bicarbonate at 15 mEq/L possibly implying metabolic acidosis. Renal function test was unremarkable (Sr creatinine 0.8 mg/dL, urea 27 mg/dL). Liver function test revealed the following results: total bilirubin 3.5 mg/dL, direct bilirubin 0.3 mg/dL, indirect bilirubin 3.2 mg/dL, total protein 5.3 g/dL, albumin 2.3 g/dl, globulin 3.0 g/dl, A:G ratio 0.7, aspartate aminotransferase 27 U/L, alanine transaminase 23 U/L, alkaline phosphatase 120 U/L and gamma glutamyl transaminase 31 U/L. These abnormal liver function values point to BCS and DCLD. Serum ammonia was markedly increased at 172 µmol/L due to underlying liver disease and traumatic brain injury. Hepatitis and HIV tests were negative.

The patient underwent a USG of the abdomen and Doppler study. Reports showed gross ascites, chronic liver parenchymal disease with splenomegaly, bilateral increased renal cortical echoes and Budd Chiari syndrome. An ECHO was ordered which showed adequate LV Systolic function, mild pulmonary hypertension (45 mm Hg) and an LV ejection fraction of 60%.

Bloodwork sent on day two, showed a decrease in RBS (123mg/dL) and improved electrolyte levels. Hb remained unchanged for which 4 pint PRBC was repeated. 4 units platelet transfusion was done since platelet count was still low at 21,000 cells/mm^3. An arterial blood gas (ABG) was ordered since SPO_2 and $FiO_2$was 99% and 40% respectively. The pH was 7.485; $pO_2$16.8 mmHg; pCO_2 83.8 mmHg, HCO_3 12.4 mmol/L and AnGapwas 15.2mmol/L. Glucose levels dropped to 64 mg/dL, indicating hypoglycaemia and was intervened with 25% dextrose in 100ml solution.

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This cross-sectional study shows there is a high prevalence level of depression among the Shadan Educational group of institutions and the study showed a significant association between depression with socioeconomic variables, based on these findings it is better to design a mental health promotion and prevention strategies should be prepared for the students during this COVID-19 Pandemic, there should be qualitative and longitudinal studies have to be conducted to understand the cause-effect depression relationship between the outcome and associated variables.

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On day three, patient condition improved and became conscious, oriented and started RT feed. Hb increased to 10.1 mg/dl.Ammonia on third day significantly reduced to 74 µmol/L. Patient was intervened with IV fluids, 4 pint PRBC. 25% dextrose was continued as sugar levels kept declining.

Diagnosis and Treatment

Based on the investigations, the patient was diagnosed to have Budd Chiari syndrome decompensated chronic liver disease, pulmonary hypertension, hepatic encephalopathy intracranial haemorrhage, seizure disorder, right leg cellulitis, and anaemia**.**

Treatment on admission to the ED consisted of the following parenterals: pheneramine 1 amp IV STAT and hydrocortisone 100cc IV for rashes; pantoprazole 40mg IV as prophylaxis for gastric ulceration, ondansetron 4mg; and Vitamin K 1 amp (10mg/ml) for lower leg bleeding. Then she was shifted to step-down ICU where she was administered infusion InjL-Ornithine-L-aspartate5 amp (5g in 10ml/amp) in 500ml normal saline (over 6 hrs) on day one and day four as hepatic protectant, Inj. ondansetron 4mg IV BD and Inj.Vitamin K 1 amp OD were continued. Other drugs were Inj. piperacillin/ tazobactam 4.5g BD; Inj Pantoprazole was substituted by Inj. Esomeprazole 40mg OD and multivitamin injection for thrombophilia. Through Ryles tube, ursodeoxycholic acid 150mg BD, bromocriptine 1.25mg TDS, and rifamycin 400mg BD for hepatic encephalopathy and liver cirrhosis and levetiracetam 500mg BD and lacosamide 100mg BD for seizure were administered. Syrup lactulose 10ml TDS for 4 days and lactulose enema TDS per rectal on day one and two were given as the patient was suffering from constipation after she was shifted to ICU. For the cellulitis, USG guided foam sclerotherapy was performed. The patient was advised for leg elevation.

Patient went into sudden cardiac arrest on day 4 at 4.10 pm. She was administered inj. adrenaline 1cc (1mg/ml)IV according to ACLS protocol and ambulatory ventilation was given. BPand carotid pulse were in query since pulse was not palpable. Consecutively five doses of Inj. Adrenaline 1ccIV was given alongside CPR with ambulatory ventilation. Carotid and peripheral pulses were absent. BP could not be recorded, pupils were dilated and there was a flat-line in the ECG. The patient succumbed to death.

Table 1 – Laboratory Investigations

Parameters	Day 1	Day 2	Day 3
SYSMEX COUNT			
Haemoglobin (g/dL)	6.9	6.9	10.1
WBC (103/ul)	8.28	8.28	-
RBC (106/ul)	2.43	-	-
HCT (%)	23.1	-	-
MCV (%)	95.1	-	-
MCH (%)	28.4	-	-
MCHC (%)	29.9	-	-
Platelet Count (103/ul)	2.1	2.1	-
RDW-SD (%)	65.0	-	-
RDW-CV (%)	19.7	-	-
PDW (fL)	00.0	-	-
MPV (fL)	00.0	-	-
P-LCR (fL)	00.0	-	-
PCT (%)	0.00	-	-
Polymorphs (%)	93.2	93.2	-
Lymphocytes (%)	3.4	3.4	-
Monocytes (%)	3.3	3.3	-
Eosinophils (%)	0.0	0	-
Basophil (%)	0.1	0.1	-

BLOOD SUGAR			
Random blood sugar (mg/dL)	189, 160(14:39)	123	79,198(11/01 AT 8AM)
COAGULATION PROFILE			
PT (sec)	25	-	-
INR	1.88	-	-
ELECTROLYTES			
Sodium (mmol/l)	128	132.7	136
Potassium (mmol/l)	4.1	3.85	3.3
Chloride (mmol/l)	108	109	-
Bicarbonate (mmol/l)	15	-	-
RENAL FUNCTION TEST			
Blood urea (mg/dl)	27	-	-
Creatinine (mg/dl)	0.8	-	-
eGFR (mg/dL/1.73 m^2)	>60	-	-
LIVER FUNCTION TEST			
Total Bilirubin (mg/dL)	3.5	-	-
Bilirubin Direct (mg/dL)	0.3	-	-
Bilirubin Indirect (mg/dL)	3.2	-	-
Total Protein (g/dL)	5.3	-	-
Albumin (g/dl)	2.3	-	-
Globulin (g/dl)	3.0	-	-
A/G Ratio	0.7	-	-
Alkaline Phosphatase (U/L)	120	-	-
AST (U/L)	27	-	-
ALT (U/L)	23	-	-
GGT (U/L)	31	-	-
ARTERIAL BLOOD GAS			
pH	-	7.485	-
pCO2 (mmHg)	-	16.8	-
PO2 (mmHg)	-	83.8	-
HCO3- act (mmol/L)	-	12.4	-
HCO3- std (mmol/L)	-	16.6	-
AnGap (mmol/L)	-	15.2	-
OTHER INVESTIGATIONS			
Serum ammonia (µmol/L)	172	-	74
TSH	1.71	-	-

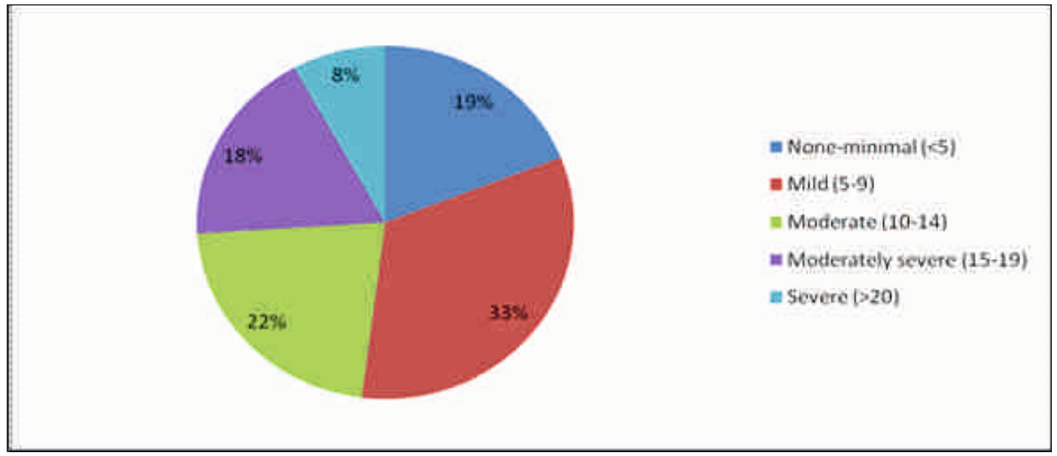

Fig – 2 : Depression assessment based on PHQ 9

DISCUSSION :

The study reveals the depression prevalence and its associated predictors among students in the Shadan Educational group of institutions because of the ongoing pandemic with online education classes and online exams. Covid-19 is highly infectious with unpredictable outcomes on the health with a huge impact on a great number of individuals with depression may have an impact of the outbreak in terms of restrictions on the lifestyle of normal individuals. Depression leads to serious issues concerning to health that contribute to academic and psychosocial dysfunction. The findings of the study in general showed students experienced depression with the impact of online education. The study revealed that the percentage of students that have moderate depression was 22% and 18% of students have moderately severe depression and 8% of students have severe depression, the data revealed there is predictable depression in students due to the ongoing curriculum classes that are being held in online mode. Because of the curfew system and the ongoing classes with online mode have increased the use of the internet drastically for about 6 hours a day of internet browsing continuously.

In our study, among Pharm.D students the depression was highest in the 3rd year when compared to all years of the study, in the case of B.pharmacy the depression rate was highest in 1st year when compared to all the years of the study, but in the case of MBBS students the depression rate was higher in 4th year, B.Tech the depression rate was highest in the starting year of the course, based on the data of different courses the depression rate was higher in I and III year students.

The study shows that a significant amount of students were experiencing various levels of depression, screened using PHQ-9 questionnaire like the study conducted by Md. Akhtarul Islam et al in August 2020.[11]

Regarding the age of students and the female to male ratio, our study is in line with the study conducted by Iman. A. basheti et, al which reported the mean age as 21.62 and the greater percent being females (67.1%).[12]

These results indicate that a relationship exists between sleep patterns and depressive symptoms. Previous studies have shown that sleep problems are common among college students. Academic stresses were found to be high in 36% of the students and the satisfaction with the course was 42% which was similar to that found by MirnaFawaz and Ali Samaha in October 2020, which revealed 41.35%.[13]

CONCLUSION

The study reveals depression among students due to COVID-19 Pandemic due to online teaching system and there is a greater degree of depression was discovered to be highest in the 1st year and the depression prevalence decreased as the years of stay in the college is increased, the reasons may be due to extensive syllabus, sleeping habits, extensive time that has been spent in online classes, students, but the depression prevalence has been decreased as the years of stay in the college has been increased.

Variables	Category	Frequency (n)	Percentage (%)
Academic performance	Satisfaction with degree course duration	378	42
	Enough time for studies	216	24
	Satisfaction with teaching module/ mode	135	15
	Study loads bother daily activity	90	10
Internet browsing time	<1 hour	207	23
	2-5 hours	378	42
	6-12 hours	153	17
	Most part of the day	162	18

TABLE NO. 5 : Distribution of factors associated with academic performance and internet browsing tim

Depression	Frequency (n)	Percentage (%)	P value
None – minimal (<5)	171	19	0.87
Mild (5-9)	297	33	0.64
Moderate (10-14)	198	22	0.05
Moderately severe (15-19)	162	18	0.12
Severe (>20)	72	08	0.51

TABLE NO. 6 : Depression assessment (N = 900

Discussion

BCS is a congenital disorder with classical symptoms of thrombophilia [6]. The patient presented with pedal edema, right foot cellulitis and bleeding which can be correlated with decreased platelet count, increased PT and INR; indicating thrombophilia. Blood glucose levels were abnormally fluctuating in this patient .i.e. patient was hyperglycaemic initially, within a day the sugar levels fell substantially for which 25% dextrose in 100ml of NS was given every 4 hours with continuous monitoring of blood glucose levels. Leg ulceration can be seen in previous reports of BCS but in this patient it progressed to cellulitis [7].General treatment of BCS includes anticoagulant drugs, thrombolytics (streptokinase, urokinase, recombinant tissue-type plasminogen activator (rt-PA), and other modalities) and diuretics which are not administered in this case [8]. The patient presented with microcephaly, abnormal weight, height, seizure and SAH (subarachnoid hemorrhage), which makes the case suspicious for diagnosis of *Microcephalicosteodysplastic primordial dwarfism type II (MOPD II)*. This can be correlated to the study conducted by James et al [9]. According to the ABG report taken on day two, AnGap was 15.2 mmol/L which shows that the patient had type 2 metabolic acidosis. This elevated value can also be related to the hypoalbuminemic state (2.3 g/dl). The main indication for hepatic encephalopathy is considered to be ammonia levels (172µmol/L) and other intestinal neurotoxins, manganese and the benzodiazepine-GABA system [10]. Early diagnosis and treatment is key to managing patients with BCS. This report thus illustrates how BCS can be fatal and requires critical care and continuous lifelong monitoring.

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We owe our heartfelt thankfulness to our beloved Principal Dr. T. K. Ravi and Dr. P. Sukumaran, Dean & Director, Sri Ramakrishna hospital, Coimbatore for providing necessary facilities to carry out this work. We also acknowledge the Tamil Nadu Dr. M. G. R Medical University, Chennai for their guidance during the study.

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JOHP

A Review on Breast Cancer: Self Examination as an Early Tool for Diagnosis

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Abstract:

In the majority of countries around the globe, breast cancer is the most commonly identified malignancy among women. Breast self-examination (BSE) is one of the first beneficial screening tool that empowers women by increasing their knowledge of their breast tissues and aiding in the detection of any breast abnormalities that may emerge. The existence of a family history of breast cancer and the goal of early diagnosis of breast cancer were indicated boosters to frequent BSE adoption. Males and females react to breast cancer in different ways. Multi-center studies with more patients are needed to focus on treatment, prognosis, tumor biology, and survivability factors.

Keywords
Breast Self-examination, Women, Diagnosis, Breast Cancer

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The Sleep Time of the total participants was 432 (48%) had >8 hours of sleep and 468 (52%) had < 8 hours of sleep. The Sleep Satisfaction of the total participants was 315 (35%) had good/sound sleep, 540 (60%) had moderate sleep and 45 (5%) had poor sleep satisfaction. Physical exercise of the total participants, out of which 198 (22%) had little/no exercise, 225 (25%) were lightly active, 405 (45%) were moderately active and 72 (8%) were very active. Among the total of the participants, 891 (99%) have not been drinking alcohol, 855 (95%) were not smoking cigarettes and 774 (86%) had not been addicted to hookah smoking

Variables	Category	Frequency (n)	Percentage (%)
Sleep time	>8 hours	432	48
	<8 hours	468	52
Sleep satisfaction	Good/sound sleep	315	35
	Moderate sleep	540	60
	Poor sleep	45	05
Physical Exercise	Very active	72	08
	Moderately active	405	45
	Lightly active	225	25
	Little/no exercise	198	22
No Social Habits	Cigarette	855	95
	Alcohol	891	99
	Hookah	774	86

TABLE NO. 4 : Distribution of factors related to sleep, physical exercise and social habits.

Out of the total participants, 378 (42%) had satisfaction with degree course duration, 216 (24%) had enough time for studies, 135 (15%) had satisfaction with teaching module/mode, 90 (10%) had study load bothers daily activity and 81 (09%) had able to meet study time. The internet browsing time of the total participants, 207 (23%) had the time of<1 hour, 378 (42%) had the time of 2-5 hours, 153 (17%) had 6 – 12 hours of internet browsing time and 162 (18%) had the internet browsing time for the majority of the day.

Variable	Category	Frequency	Percentage(%)
Living Place	With his/her family	720	80
	With his/her house friends	81	09
	Alone	54	06
	In dormitory/ hostel or any accommodation	45	05

TABLE NO. 2 : Distribution according to living place

Among the total of the participants, 720(80%) had a good relationship with their parents, 153(17%) had a moderate relationship and the rest 27(3%) had a poor relationship. Out of the total respondents, 0 (0%) had poor health status, 198 (22%) had the moderate health status and 702 (78%) had the good health status and Nuclear family were 270 (30) and joint family was discovered as 630(70).

Variables	Category	Frequency (n)	Percentage (%)
Parental relationship	Good	720	80
	Moderate	153	17
	Poor	27	03
Health Status	Good	702	78
	Moderate	198	22
	Poor	0	0
Family	Nuclear	270	30
	Joint	630	70

TABLENO. 3 : Distribution of factors related to social relationship, health status and social habits.

Introduction

Breast cancer is a major health concern. Breast cancer strikes females at their most productive years of life, but if caught early enough, it can be cured with low costs.[1] Male breast cancer (MBC) is an uncommon condition that affects fewer than 1% of all breast cancer diagnoses around the world. Although breast carcinomas in both genders have some characteristics, there are also major variances. The majority of studies on breast cancer in men are tiny. MBC is an uncommon condition that affects fewer than 1% of all breast cancer diagnoses around the globe.[2] However, treating advanced stage disease is costly, and the prognosis is frequently bad. Mammography and physical examination of the breasts by a physician or skilled health worker, as well as clinical breast examination (CBE) and breast self-examination (BSE), are the most essential strategies for early identification of breast cancer. BSE is a procedure in which women inspect their breasts on a daily basis in order to discover any abnormal swelling or lumps and seek medical help as soon as possible. BSE performed once a month between the seventh and tenth days of the menstrual cycle, can help discover breast precancerous lesions when it is less likely to spread, resulting in a better prognosis when diagnosed.[1] Breast cancer progresses more quickly in younger females, especially those of reproductive age, than in older women, resulting in a considerable drop in their life expectancy.[3] Breast cancer is indeed a multi-step process that involves multiple cell types, and screening is still difficult around the globe. It is a malignant cancer that can spread to distant parts of the body such as the bone, liver, lung, and brain, making it nearly impossible to cure.[4] The existence of a family history of breast cancer and the goal of early diagnosis of breast cancer were indicated boosters to frequent BSE adoption.[5] Long delays in seeking medical care and the terminal stage of the disease at presentation are two factors that contribute to the high death rate of breast cancer (BC).[6] Educational initiatives have a vital role in enhancing women's breast cancer screening understanding, perceptions and practices.[7] In certain regions of the world, especially in low and middle nations, breast cancer incidence and increased mortality are rising. The adoption of a Modern lifestyle, which includes changes in diet, physical activity, and reproductive habits is primarily responsible for the development of breast cancer. The worldwide impact of breast cancer is expected to rise further because the population grows and ages, especially in low and middle nations. To successfully implement breast cancer control programs and enhance access to the treatment, it is vital to raise knowledge about breast cancer and the benefits of early detection, particularly in developing nations.[8]

Types of breast cancer

The irregular growth and multiplication of cells that start in the breast tissue is referred to as breast cancer. There are two types of tissues in the breast: glandular tissues and stromal (supporting) tissues. The milk-producing glands (lobules) and ducts (milk passageways) are located in glandular tissues, while the fatty and fibrous connective tissues of the breast are located in stromal tissues.

There are a variety of tumor's that can grow in different locations of the breast. The majority of tumors in the breast are caused by benign (non-cancerous) alterations. The cells that line the ducts are where most breast tumors start (ductal cancers). Some cancers start in the cells that line the lobules (lobular cancer), while others begin in other tissues.

- **Lobular carcinoma in situ** (LCIS, lobular neoplasia) is a type of cancer that has not migrated beyond the site where it first appeared and characterized by a significant increase in the number of cells in the breast's milk glands (lobules).
- **Ductal carcinoma in situ** (DCIS) is a type of non-invasive breast cancer that is limited to the ducts of the breast.
- **Infiltrating lobular carcinoma** (ILC) also known as Invasive lobular carcinoma. ILC begins in the milk glands (lobules) of the breast, but it often spreads to other parts of the body, accounting for 10 percent.
- **Infiltrating ductal carcinoma** (IDC) is also known to as Invasive ductal carcinoma. IDC begins in the breast milk ducts and penetrates the duct wall, infiltrating the breast fatty tissue and possibly other parts of the body. The most frequent kind of breast cancer is IDC, which accounts for 80% of all breast cancer.
- **Inflammatory breast cancer -** The look of inflamed breasts (red and heated) with dimples or thick ridges caused by cancer cells blocking lymph veins or channels in the skin around the breast is known as inflammatory breast cancer. Inflammatory breast cancer is a rare cancer that accounts for only 1 percentage of all breast cancers.[9]

Breast cancer etiology

The most common type of cancer and the second biggest cause of death is breast cancer. This disease is the main cause of death in women aged 45 to 55 years old, and it is also the second leading cause of cancer-related death. Breast cancer affects nearly one in every eight women and, in the majority of cases, necessitates full tissue excision, chemotherapy,

radiotherapy, and hormone therapy. Breast cancer is a type of cancer that affects the inner layer of milk glands known as lobules and ducts (tiny tubes that carry the milk). Age, high hormone levels, race, economic condition, and iodine deficiency in the diet are all major cancer risk factors. Viruses play a role in one stage of the pathogenic process in breast cancer which is a multi-stage illness.[10]

Breast cancer and support system

Breast cancer, like all other forms of cancer, is a global public health issue that affects people all over the world. Support received in the form of knowledge or a tangible item, as well as emotional support; or sources of support (for example family or friends) that boost the receivers' self-esteem or provide stress-related interpersonal aid are referred to as social support. Patients with chronic diseases such as breast cancer need social assistance to survive and have a good quality of life. In organizing social support for chronic disease patients, healthcare professionals, family members and significant others play a key role. Social support has been linked to better treatment results for a variety of chronic illnesses including breast cancer and it helps to alleviate the stress that comes with a cancer diagnosis while also improving emotional well-being.[11]

Breast cancer and family

According to WHO data, over 2.1 million new instances of breast cancer were reported worldwide in 2018, and breast cancer is the main cause of cancer-related deaths among women. A family history of breast cancer is a key risk factor roughly 5 to10 percent of breast cancer cases are linked to a genetic history. The disease features of patients upon diagnosis, particularly patient age, tumor stage, and grade, can be influenced by a family history of breast cancer. Close relatives who acquire breast/ovarian cancer at an earlier age enhance the overall risk of breast cancer. Although genetic testing is currently unusual in the general population, clinical evaluation is the only way to fully comprehend the significance of the association between family history and breast cancer risk.[12]

Breast cancer with smoking tobacco

Smoking was attributed to a fairly significant increase in the risk of breast cancer, especially among those who started while they were adolescents or premenopausal, and the relative risk of developing breast cancer was considerably higher for women with a family history of the disease.[13] Despite intense anti-smoking programs in recent years, cigarette smoking is connected with increasing morbidity and death around the world and remains a popular way of life.[14]

Breast cancer and lifestyle

Only alcohol is commonly acknowledged as the most persistently connected with breast cancer risk. When it comes to nutrition, according to the existing evidence, soy food consumption tends to be inversely proportionate to cancer, but caloric carbohydrates and fiber consumption appear to have no link. Dietary fat intake is likely to be associated with a higher risk of breast cancer. While research examining the influence of fruits, vegetables, meat, and dietary practices the risk of breast cancer has yielded mixed results. Cuisine appears to be only tangentially linked to the disease, underscoring necessity greater research.[15]

Clinical manifestations:

The most frequent symptom of breast cancer is a benign lump or enlargement in the breast. Even if there is no discomfort connected with an abnormal lump in the breast, it is critical that individuals visit a healthcare professional within 1 to 2 months of identifying it. Important to seek medical help as soon as a significant ailment appears allows for more efficient therapy.

The following are some of the most common signs and symptoms of breast cancer:

- A breast bump or swelling;
- A variation in breast size, texture, or contour;
- Discoloration, dryness, scaling, or other skin changes;
- Alteration in nipple appearance or changes in the skin covering the nipple (areola);
- Nipple discharge that is abnormal.

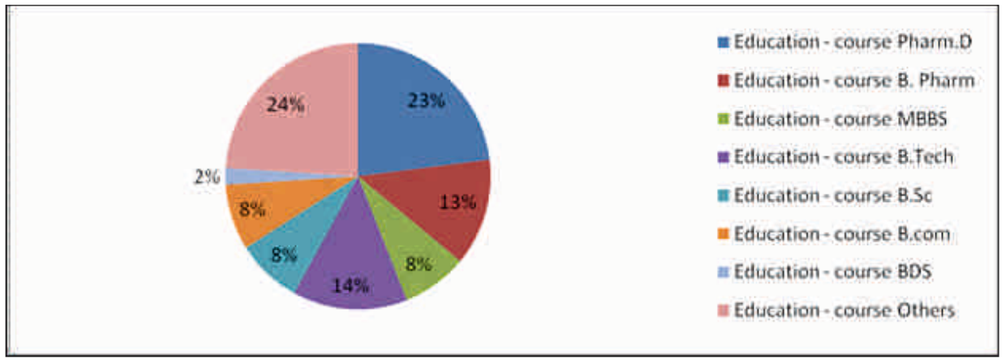
Breast cancers have the potential to spread to certain other parts of the body, resulting in additional ailments. Even though it is uncommon to have cancer bearing lymph nodes that are not apparent, the lymph nodes underneath the arm are perhaps the most frequent initial noticeable location of dissemination.[16]

Variables	Category	Frequency	Percentage (%)
Age	Mean and SD	20.34 ±15.82 years	____
Sex	Male	288	32
	Female	612	68
Residence	Urban	702	78
	Rural	198	22
Religion	Islam	504	56
	Hindu	36	4
	Sikh	09	1
	Others	189	21
	Not mentioned	504	56

TABLE NO. 1 : Distribution of Sociodemographic variables

Out of the participants, 207 (23%) were of the course Pharm.D, 117 (13%) were of the course B.Pharm, 126 (14%) were of the course B.Tech, 72 (8%) were undergoing the courses MBBS, BSc and B.com and 216 (24%) were undergoing other different courses of Education

Fig – 1 : Sociodemographic representation according to Education course



The variable data with respect to living place among the participant was 720(80%) lived with their parents, 81(09%) lived with their friends, 54(06%) lived alone and 45(05%) lived in the dormitory or hostels

METHODS AND METHODOLOGY

Source of data:

The use of a standard questionnaire to collect the data.

Method of data collection:

Using standard questionnaires, data was gathered by using a pre-tested interviewer filled out questionnaire in which depression was dependent variable and a number of other determinants, including socio-demographic factors, clinical factors, social support, etc.,

Study Site: This study was carried out among the students of Shadan educational institutions

Study Duration: The study was carried out for a period of 6 months from November 2020 onwards.

Study Design: A Survey Research.

Sample Size: A total of 900 students were enrolled in the study.

Study Criteria: Students of Shadan Educational Institutions were randomly selected based on the below exclusion and inclusion criteria.

Inclusion Criteria:

- Age: 16- 24 years.
- Gender: Male/ Female.
- Students who are willing to participate.

Exclusion Criteria:

- Pregnancy.
- Lactating mothers.
- Diseased conditions ex: Hypertension, asthma, diabetes, etc.
- Schizophrenic patients.
- Previous history of any mental disorder.
- Epileptic patients.
- Patients with other brain-related disorders.

Participants:

The sample of the study comprised of 900 individuals from Shadan Educational Institutions out of which 67% were female and 32% were male. The data was collected by the circulation of online survey forms in the Shadan Group of Institutions. The participants were selected randomly from the students attending Shadan Educational Institutions. The participants were between the ages of 16 – 24 years.

Instruments:

The instruments used in the research are Demographic form and PHQ-9 questionnaire.

Study Procedure:

The study was conducted among various colleges of Shadan Educational society. An online survey form from Google was created with key demographic variables and a PHQ-9 questionnaire for distribution to students. Students included in the study paid attention to inclusion and exclusion criteria. A statement of student consent was obtained at the time of registration of the study. Confidentiality was maintained. The completed questionnaire was scanned, positive responses were tested and screening algorithms were applied.

There are several assessment tools available to assess or screen for depressive disorders.

These Questionnaires are not a diagnostic questionnaire, but rather help determine when:

a more precise assessment is required.

RESULTS

The frequency of the population size was 900 (N). The age group among the students that was selected was 16-24 years and the mean age was calculated standard error mean was discovered as 20.34 ±15.82 years. Among the sex male were 288 (32%) and female were 612(68%). The residence among the students considered was rural 198(22%) and urban were 702 (78%). Out of the participants, 504(56%) were Muslims, 36(4%) were Hindus, 09(1%) were Sikhs, the rest did not mention their religion.

Risk factors

Many risk factors, including sex, ageing (early menarche and late menopause), estrogen, genetic predisposition, gene abnormalities, declining trend of breastfeeding and a sedentary lifestyle might raise the likelihood of getting breast cancer.[4]

Diagnosis:

- Mammography.
- Magnetic resonance imaging (MRI).
- Molecular breast imaging (MBI).
- Breast biopsy.[17]

Self-examination of the breast

Regular breast self-examination is one of the most cost-effective approaches for asymptomatic women to discover breast cancer early. BSE is a type of assessment that incorporates the woman looking at and examining each breast for lumps, deformities, or puffiness. In many nations, BSE is still uncommon. BSE is still advised as a general strategy for raising breast health consciousness and detecting problems early. Healthcare professionals continue to suggest BSE since it is free, easy, requires little technology, and can be taught.[18] BSE is a valuable screening tool for finding breast cancers. This method allows women to become more acquainted with their breasts, making it much easier for them to spot any anomalies. Females above the age of 20 should have BSE performed on a regular basis. BSE entails seeing and palpating the breast for bumps, structure, thickness, volume, and contour on one's own.[19] Breast cancer patients will have a good prognosis if they are discovered at an earlier phase, hence attempts to identify breast cancer early are critical. BSE is a crucial first step in encouraging women to take reasonable care for the health, particularly in low- and middle-income nations where resources and accessibility to other sorts of preventative healthcare are restricted (screening programs).[20]

BSE should be undertaken 5 to 7 days after menstruation has ended, when

Hormone effects are at the lowest; women who are not menstruating should do it on any day of the month, but it should be done on the same day every month.

In front of the mirror

- Check if there is any variation in the size, shape, texture, or skin of your breasts in front of the mirror, bare-chested and with your arms falling freely on the sides.
- After that, putting your palms on your hips and firmly press them together. Turn to both sides to examine the outer areas of your breast.
- Bend over and rotate your shoulders and elbows to the front to contract your breast muscles.
- Fold your hands over your backs, firmly gripping the backs of your hands, and stretching your elbows backwards. Check the outside surfaces, especially the undersides of your breasts. If necessary, lift your breasts with your hands to see this area.
- Place your index and thumb on the area surrounding the nipple and pull to see if there is a discharge coming from the nipple.

During bath

- Lubricate your hands with soap to make it easier to feel changes in the breast.
- Raise one arm above your head. Examine with 2nd, 3rd, and 4th fingers of hand by gently pressing your skin with the inner surfaces of your fingers and examining your entire breast and armpit area. As a result, the densities on the top outer breast quadrant are more visible.
- By gradually reducing the circles towards the nipple, you may examine the entire area. Later beginning from the armpit, move your finger up and down. Shift your movements towards the inner region of the breast, making careful to contact the bottom edge.
- Check all breast tissue by performing a star like motion with your finger from the outside perimeter of the breast to the nipple, also double check the armpit.

In supine position

- Place a small pillow or a folded towel beneath your right shoulder as you lie down. Your right hand must be at

the back of your head. Place your left hand over the top half of your right breast, fingers together yet again. You can apply body lotion or oil to simplify things.

- Examine the entire surface in small clockwise circles all the way back to the starting point. When the circle is complete, go around the nipple with the same circular motion. Continue in this manner until the entire breast surface has been screened. Make sure to look at the areas closer to the armpit as well. Check for any changes around your nipple by placing your fingers directly on it in a straight position. Press the nipple gently. Check to see whether it moves smoothly. Repeat the procedure for your second breast afterwards.[21]

Prevention

- Clinical and theoretical research of breast cancer have progressed significantly. Screening, chemoprevention, and biological prevention are now more direct and effective than in the past. However, breast cancer remains the primary cause of death among women.[4]

Management:

- **Surgery -** Lumpectomy (removal of the lump only) or mastectomy (surgical removal of the entire breast) is performed depending on the stage and nature of the tumors. Quadrantectomy (About one fourth of the breast is removed).
- **Chemotherapy** - Chemotherapy is the treatment of malignant cells with anti-cancer medicines. Breast cancer therapy will be determined by factors such as medical history, age (whether menstruating or not), and stage of cancer, and tolerance for specific medications and treatments. Chemotherapy treatments are provided in cycles, with a period of treatment followed by a period of recovery.[22] CT partially exerts its effect in (ER) - Estrogen receptor positive malignancies by inducing ovarian failure. CT is usually given for 12 to 24 weeks (four to eight cycles), depending on the individual's risk of recurrence and the regimen chosen.[23]
- **Radiation therapy**

  The use of high energy X-rays or gamma rays to treat a tumor or a post-surgery tumor location is known as radiation therapy. These rays are extremely effective at killing cancer cells that may linger after surgery or return where the tumor was destroyed.[22] However, RT has some side effects, including reduced sensation in the breast tissue or under the arm, skin problems in the treated area, such as soreness, itching, peeling, and/or redness, and the skin becomes moist and weepy at the end of treatment.[23]

Conclusion

Breast cancer is the most frequent cancer in women in the world, with the exception of 42 countries where cervical cancer still reigns supreme. Breast cancer survival is heavily reliant on a woman's ability to receive prompt, quality, and economical treatment. Breast cancer survival depends on early diagnosis. Breast cancer fatality can be reduced significantly when proper medical treatment, appropriate follow-up and survival care are provided.[24]

Women in many studies have a pretty higher perception regarding BSE. However, amongst most healthcare personnel in certain surveys, the level of practice is low.[19] Educational efforts are needed to persuade young women to do BSE on a regular basis so that breast abnormalities can be diagnosed early and deaths reduced.[3] A better healthcare system is required to provide resources for the management of breast cancers discovered through early diagnosis initiatives, whether through screening or symptomatic breast cancer.[24]

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INTRODUCTION

Depression is a common and often chronic disorder that may manifest at anytime in one's life.

Screening of students attending universities and/or affiliated colleges helps in the early detection of depression/depressive behavior. It is often not diagnosed in many patients until it is too late. Early detection may reduce the development of suicidal tendencies in individuals.

Depressed students are at a greater risk of developing problems such as substance abuse. Detection and management of students suffering from depression helps in improving their quality of life and in turn aid their academic performance.[1]

Depression is mirrored as a major health problem which causes decline of productivity in studies or work, cognitive, psychomotor and vegetative alteration, loss of initiative and apathy[2]

Different treatment options have been developed for treatment of depression over the decades. These different approaches include pharmacotherapy, psychotherapy and somatic therapy often employed for treatment of resistant depression. In 2000, the American Psychiatric Association (APA) published refined, standardized criteria for diagnosing depressive disorders in the Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition, Text Revision (DSM-IV-TR)

Depressive disorders are classified under Mood Disorders in DSM-IV-TR and include major depressive disorder; single-episode or recurrent, dysthymic disorder; and depressive disorder, not otherwise specified.

The major depression may present as a single episode but most commonly occurs as a series of recurrent events. As stated earlier, depression is a chronic illness in many patients. Symptoms of depression may be induced or exacerbated by numerous medical illnesses or medication.

The clinician should be aware that the actual evidence demonstrating an association between depression and specific organic causes is often very limited and anecdotal. If a medication or condition is suspected of causing depression the chronologic association should be investigated rigorously before other action is taken[3]. The online education among the college students has increased the level ofstress and pressure among students and increased the chances of vulnerability to psychologicalproblems. Due to this pandemic students experienced depression and reported poor quality of lifeand academic difficulties[4,5] .According to the burden of mental disordersacross the states of India the global burden of disease study 1990-2017 one in seven Indians wereaffected mental disorders of varying severity in 2017 and the proportional contribution of mentaldisorders to the total disease burden in India has almost double since 1990[6,7].

That is why we have selected university students from various colleges to study depression caused by the COVID-19 pandemic for online follow-up courses and its impact on academic life in relation to different types of stress and its effects on examining the performance. It is, therefore, necessary to investigate psychiatric morbidity among students as most psychiatric illnesses due to this COVID-19 pandemic have a great impact on their studies and to understand and understand depression in students using questionnaires in online and offline mode identify. The focus of this study is to assess the degree of depression among students of different colleges for the instance of depression or the students in health care and to identify factors that affect the risk of different high school scores and incidents of different high school students.The study and research report will be useful in educating public health decision-makers about the integration of mental and psychosocial support and wellness products into online education and testing systems. We, therefore, attempted to examine the incidence of depression, as well as socio-demographic and personal predictions of depression among healthcare professionals during a COVID-19 pandemic.

Depression is amongst the most frequently under-diagnosed diseases. Although there are efficient methods for the treatment ofpsychiatric problems, around 76% to 85% of the population in developing and underdeveloped countries are left untreated because of their illness[8]. People with depression are often misdiagnosed while others without the disorder are often misdiagnosed.

Although many people experience mental illnesses such as depression, there appears to be a strong social stigma correlated with these illnesses, which is often the result of misunderstanding and/or fear[9]. Studies of stigma studies show that although the public accepts the medical or genetic nature of mental disorders and the need for treatment, many people still have negative attitudes towards people with mental illness. Along with the patient, friends and family of the patient are also affected. Almost nine in ten people with psychological problems say stigma and bias have devastating effects on their lives[10].

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JOHP

A Cross-Sectional Study to Assess the Prevalence of depression and its associated factors among college students in a selected private hospital in Hyderabad

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ABSTRACT

Mental health, such as physical health, is essential to success and a happy life. Depression is undoubtedly amongst the most neglected and least treated psychological problems in adolescence. It's not just about mood swings; These are almost every other aspect of a teenager's life, such as sleep, desire, energy, and general health. It impairs the ability to concentrate and think which leads to a drop in academic performance. In the worst case, depression can lead to suicide. Almost 800,000 people die from suicide each year. The second greatest cause of death among 15-29-year-olds is suicide. In recent decades, a number of treatment options have been developed for treating depression. These different approaches include drug therapy, psychotherapy, and somatic therapy, which are often used to treat drug-resistant depression.

In this study, we have selected university students from various colleges to study depression caused by the COVID-19 pandemic for online follow-up courses and its impact on academic life in relation to different types of stress and its effects on examining the performance and attempted to examine the incidence of depression, as well as socio-demographic and personal predictions of depression among healthcare professionals during a COVID-19 pandemic. PHQ-9 standard questionnaires were prepared and the cross-sectional study was conducted through Google forms and physical evaluation form during the ongoing COVID-19 Pandemic. The frequency of the population size was 900 (N). The age group among the students that was selected was 16-24 years and the mean age was calculated standard error mean was discovered as 20.34 ±15.82 years. Among the sex male were 288 (32%) and female were 612(68%). The residence among the students considered was rural 198(22%) and urban were 702 (78%). Out of the participants, 504(56%) were Muslims, 36(4%) were Hindus, 09(1%) were Sikhs, the rest did not mention their religion. 207 (23%) were of the course Pharm.D, 117 (13%) were of the course B.Pharm, 126 (14%) were of the course B.Tech, 72 (8%) were undergoing the courses MBBS, BSc and B.com and 216 (24%) were undergoing other different courses of Education. The study revealed that the percentage of students that have moderate depression was 22% and 18% of students have moderately severe depression and 8% of students have severe depression, the data revealed there is predictable depression in students due to the ongoing curriculum classes that are being held in online mode.

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Etiologies of Community Acquired Multidrug Resistant Infections in a Tertiary Care Hospital - A Cross-Sectional Study

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ABSTRACT:

Antibiotic-resistant infections caused by multidrug-resistant (MDR) organisms, are a major public health concern worldwide**.** MDR bacteria are usually hospital-acquired but some community-acquired MDR infections are becoming prevalent. The present study was conducted to determine the etiologies of community acquired MDR infections. A cross- sectional, observational study was carried out at Care hospital, Nampally, Hyderabad for a duration of 6 months. All the community acquired MDR pathogens identified in the present study were found to be gram negative. The predominant pathogen was *Escherichia coli* followed by *Pseudomonas* spp, *Klebsiella* spp, *Citrobacter* spp, *Enterobacter* spp *and Proteus* spp. All the bacterial isolates exhibited complete resistance to Ampicillin.

Key words:

Antibiotic resistance, MDR infections, community-acquired, *Escherichia coli*

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NEED OF PERSONALIZE MEDICINE[16]:

- Knowledge of human genome variation and it related with drug pharmacokinetics and pharmacodynamics gives opportunity for create a data for improves the health of patient.
- Genome are differing from person to person that's why customise medicine may not work in some patients that's why in that some drug shows the side effect so to overcome such problem through personalize medicine.
- Focus on efforts for prevention and earlier intervention of disease.
- Improve medical care and safety of pharmacotherapy.
- More quickly connect with patients for right clinical therapy.
- Improvement in efficacy of drug through data of genomics and proteomics of individual patient.

ADVANTAGES OF PERSONALIZE MEDICINE[17,18]:

- The objective of precision medicine is quickly, efficiently and accurately predicting the suitable action for a patient.
- Direct the selection of optimal therapy and reduce trial-and-error prescribing.
- Help in avoiding adverse drug reactions.
- Help in control the overall cost of health care.
- Increasing opportunity to prevent disease.
- Improve method of administration.

CONTEMPORARY EXAMPLE OF PERSONALIZE MEDICINE:

§ **Personalizing early detection strategy:**

It individual is susceptible to disease for recovers from disease, then these type of individual should be monitored in the strategy. This stage monitors the claim about evidence of disease[19].

e.g. Cholesterol level >200, indicator for rise of heart disease or Systolic blood pressure > 140, indicator of hypertension and rise of heart disease.

§ **Personalising disease prevention strategy:**

In this step, use of genetic information to develop personalise disease prevention is acceptable in all community but not in clinical practice. Genetic information helps to minimize the complications from therapy and occurs at other stage[20,21]

e.g. Colorectal Cancer, in 2015, Nan et al, reported use of aspirin on colorectal cancer treatment depending on individual genotype data.

CONCLUSION:

A Personalized Medicine gaining more importance in recent year in the health care system. Also, has potential to developed easiest way of reducing therapy cost and time of recover. The information obtained from genomic variation data is helpful to physician for effective results in different disease treatment. In the precision medicine, individuals will search for information to understand their genetic profiles and other health concerns. Genomics with phenotypic screening in personalized cancer models will play an important role in accelerating drug development and increasing precision in effective drugs to the right patient. Many governments, API companies, physicians and especially patients are still not convinced with the thought of a DNA-assisted therapy. However, with the proper awareness and education combined with the endorsement of major authorities, there are high hopes for the field of Pharmacogenetics to expand and play a crucial role in healthcare improvement worldwide. In the future, concept of personalize medicine will be more useful during clinical trials.

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INTRODUCTION:

Antibiotic-resistant infections, specifically those caused by multidrug-resistant (MDR) organisms, are a major public health concern worldwide. Critically ill patients with prior antibiotic exposure or comorbidities are most susceptible to MDR infection, which can result in increased mortality, hospitalization expenses, and length of stay.[1,2] The rise of MDR bacteria poses a serious threat due to a number of factors. First and foremost, outcomes in patients infected with MDR bacteria are often poorer than in those infected with more susceptible microorganisms. Second, these illnesses come with exorbitant additional expenditures. Third, the usage of broad-spectrum antibiotics for both empiric and definitive therapy is connected to the incidence of particular MDR bacteria. This increasing usage, in turn, leads to an increase in the number of MDR bacteria, creating a vicious cycle.[3,4]

While MDR organisms are universal challenge, they are particularly dangerous in low and middle income countries, because a significant number of health-care institutions lack appropriate hospital environmental conditions and standardized infection prevention and control measures.[5] India is one of the largest low and middle income countries and the largest consumer of antibiotics. The widespread use of broad-spectrum drugs has fueled the growth of MDR organisms in both community and hospital settings.[6,7,8,9] MDR bacteria are usually hospital-acquired but some community-acquired MDR infections are becoming prevalent. Therefore, the present study was designed to determine the etiologies of community-acquired MDR infections in a tertiary care hospital in India.

METHODOLOGY:

A cross-sectional, observational study was carried out at Care hospital, Nampally, Hyderabad for a duration of 6 months (August 2019 to January 2020). The proposal of the present study was approved by the institutional ethics committee, Care Hospitals. Patients with positive culture for MDR pathogen and patients showing clinical symptoms related to the MDR pathogen before the time of admission or within 48hrs of admission into the hospital were included in the study. Patients developing clinical symptoms after 48 hours of hospitalization and patients having positive symptoms related to the MDR pathogen but with negative cultures were excluded from the study. A well-structured data collection form was used to collect the data. Information related to the demographics of the patients and antimicrobial susceptibility test results was collected. Culture and sensitivity test reports were analyzed for the specimen used, the pathogen identified, the type of resistance and sensitivity to antimicrobial agents.The following definitions were used to identify multidrug resistant (MDR), extensively drug resistant (XDR) and pan-drug resistant (PDR) bacteria, as proposed by the European Centre for Disease Prevention and Control (ECDC) and the Centers for Disease Control and Prevention (CDC) [10].

MDR: non-susceptible to at least one antimicrobial agent in three or antimicrobial groups. XDR: non-susceptible to all but two categories.

PDR: resistance to all antimicrobial agents on the list.

RESULTS & DISCUSSION

A total of 63 community acquired MDR cases were identified during the study period. 57.14% of the patients included in the study were male. Majority of the patients suffering with MDR infections were found to be in the age group of 61-80 years (40) followed by 41-60 years (12) as shown in the table 1. The mean age ± SD was found to be 66.53 ± 15.50.

Table 1: Demographic features of the subjects

Age group	Male	Female	Total (%)
..	2	3	5 (7.93)
41-60	9	3	12 (19.04)
61-80	20	20	40 (63.49)
81-90	4	1	5 (7.93)
>90	1	-	1(1.58)
Total	36	27	63

All the community acquired MDR isolates were found to be gram negative organisms. *E.coli* has been reported as the leading cause of community and opportunistic infections.[11,12] The predominant community acquired MDR pathogen in this study also was *Escherichia coli (E.coli)* followed by *Pseudomonas* spp, *Klebsiella* spp, *Citrobacter* spp, *Enterobacter* spp *and Proteus* spp.

E.coli was found to be the most frequently isolated pathogen from urine and *Klebsiella* was predominant in sputum (table 2). Other samples include pus (2 *E.coli*) bronchoalveolar lavage fluid, BAL (1 each *E.coli*, *Pseudomonas*, and *Enterobacter*), bronchoscopic fluid (1*Pseudomonas*), mini-BAL fluid (1*Pseudomonas*) and swab (1 *Klebsiella*). *E.coli was* reported as predominant MDR uropathogen by Awasthi TK et al., [13] and Imran Khan M et al.[14]

Table 2: Distribution of isolated organisms among samples

Organisms / Sample	Urine	Sputum	Others	Total (%)
Escherichia coli	31	1	3	35(55.55)
Klebsiella	5	5	1	11(17.46)
Pseudomonas	5	3	3	11(17.46)
Enterobacter	-	1	1	2(3.17)
Citrobacter	1	2		3(4.76)
Proteus	1	-		1(1.58)
Total (%)	**43(68.25)**	**12(19.04)**	**8(12.69)**	**63**

Out of 35 *E.coli* isolates identified during the study, 32 (91%) were MDR and 3(8.57%) were XDR and (table 3). Ansari etal[15] reported 78% MDR and 7% XDR and no PDR *E.coli* isolate. 5 *Klebsiella* isolates out of 11 were observed as extensively drug resistant where as only one *Pseudomonas* isolate was found to be XDR. No PDR isolate was identified.

Table 3. Distribution of subjects based on type of resistance according to individual organism

Gram Negative isolate	MDR	XDR
E. coli (35)	32	3 (2urine, 1 pus)
Pseudomonas (11)	10	1(urine)
Klebsiella (11)	6	5 (3 urine, 1sputum, 1 swab)
Citrobacter (3)	3	-
Enterobacter (2)	2	-
Proteus (1)	1	-
Total (63)	**54**	**9**

In the present study all the identified MDR gram negative organisms exhibited complete (100%) resistance to Ampicillin as shown in table 4. *E.coli* has shown complete resistance to ampicillin, cefpodoxime and ciprofloxacin followed by cefepime(97.1%), ceftazidime (94.2%), ofloxacin (91.4%), ceftriaxone (91.4%), aztreonam (80%) and Cotrimoxazole (62.8%). *E.coli* was found to be highly sensitive to nitrofurantoin and carbapenems followed by amikacin, Amoxicillin/clavulanate, Cefoperazone/sulbactam, Piperacillin/tazobactam and Ceftazidime/clavulanate. *E.coli* strains exhibited 100% resistance to ampicilli, amoxicillin, cephalexin and chloramphenicol as reported by Salem MM, etal.[16] Moini AS et al.[17] reported *Escherichia coli* resistance to ampicillin(76.1%), co-amoxiclav(26.9%), ceftazidime(30.6%),

health. In the recent study, declaration about linked genetic differences between individuals to RNA expression, translation, and protein levels[6,7].

Pharmacogenomics:

A Pharmacogenomics study have major role into give appropriate faster recovers from illness. The term Pharmacogenetics is a detailed study about individual variations within the DNA sequence; this is related to drug response. In every person has different types and unique genetic makeup which have responsibility for individual development, growth and for different response, hormones production[8,9]. Genetic variation are differences in genomes, most of the genetic variations do not show any differences or looks differently. Few genetic variations cause diseases. The genetic variation again defined as drug efficacy and toxicity in patients. Genetic variation database developed to manage the growing number of genomic data sets. These databases help to researchers and healthcare team for easy availability of genetic information. There are three types of genetic variation's name as follows,

1) Single nucleotide Polymorphisms
2) Short Insertions and deletions
3) Copy Number Variations

Each person's change in DNA responsible for change in protein end product, so the enzyme involve in drug elimination process and receptor is targeted the drug act as modify the patient's response to therapy. New concept is trending for 'one drug fits to all' and for Individualise and personalize medicine. One drug fits to all means an accurate dose of drug that gives maximize efficacy with less toxicity in individual patient. Pharmacogenetics is widely used in the new drug development and also for removing the previously marketed drug which having some side effect in minority of patients. The genomics is called as key component for the personalize medicine[10]. From health to disease stage, genome information can be providing DNA-based assessment for common or complex disease, molecular indication in the cancer diagnosis, genome-guided therapy, during selection of dose and many more for personal health care. Hence this technology has fastest development, social and information revolution which will affect on the health care way of thinking. Genomic medicine is a term based on the using informative source from genomes, both human and other organisms and their derivatives helps to guide for making a medical decision. It is possible to examine details of genome in the future[11,12].

Biomarkers[13,14,15]:

Biomarkers are widely used in all forms of clinical practice for indication of disease occurs due to infection, any toxicity and other process is taking place within an organism. Discovery and clinical qualification of biomarkers used '–omics' approaches are a main challenging in development. It is helps to improve social stratifications as well as developed a targeted therapies make easier decision making process in new drug development. Biomarkers may include lead levels within the blood, antibodies after an infection developed, thyroid hormone levels, and prostate specific antigen and at last molecular signatures may be shows a respond to advanced levelled treatment given to individual patient.

Two types of Biomarkers: 1) Predictive Biomarkers 2) Prognostic Biomarkers

Table 1: Biomarkers Used in Various Diseases

Biomarkers as drug	Therapy or Disease	Result
Maraviroc	HIV	Stratification mandatory biomarker test is used to predict efficacy.
Azathioprine	Pemphigus Valgaris	Stratification biomarker to patients is with minimum risk of side effects.
Dapsone	Leprosy and Dermatitis Herpertiformis	Biomarker used in detection of glucose -6-phosphate dehydrogenase deficiency.

INTRODUCTION

Personalize medicine in an emerging approach to patient which physicians choose a treatment method based on the patient's genetic makeup also taking into consideration for genetic changes resulting from disease and different lifestyle habits. In 2015, President Barack Obama announced a novel research on personalized medicine for cancer and diabetes treatment. Personalized medicine also known as precision medicine or individualized medicine. Author of European Union defines the personalize medicine as "Providing the right treatment to the right patient, at the right dose at the right time". An Invention of Personalizes medicine mainly for the prevention and treatment of disease in each patient with their individual characteristics[1].

Scientific Advances in past year for Personalize Medicine[2]:

- **1950s**: Watson crick discover the structure of DNA double helix.
- **1960s**: Researchers crack the genetic code.
- **1970s**: First DNA sequencing technology developed.
- **1980s**: Polymerase chain reaction(PCR) first developed, allowing for fast amplification of DNA sequences.
- **1990s**: Human genome project launched. FDA approves 1st personalised medicine for treatment of HER2 positive breast cancer.
- **2000s**: Human genome project completed. First targeted therapies for lung cancer, leukaemia, melanoma, cystic fibrosis and much other disease**.**

What is Personalized Medicine?

Personalized Medicine is a rapidly growing field and needs multidisciplinary health care teams to reach at goal to promote health and wellness. By personalized medicine we could understands a molecular pathways of disease, therefore optimal health care strategies developed in the first stage. The optimal medical care is reach upto better outcomes for each individual patients include therapy, types of medications and different dosages forms, but prevention strategies may differ from person to person, resulting into an unpredictable customization of patient care. In some clinical centres, those patients with melanoma, **leukaemia**, metastatic lung, breast, or brain cancers their physician are routinely offered a "molecular diagnosis", but due to selection of individualize treatments that can greatly improve the chances of survival from the disease[3]. Personalized medicine based technology that first confirms a patient's fundamental biology, DNA, RNA, or protein which leads to confirming disease It is a major term gives better approach to patient's care but also improves our ability to diagnose and treatment for diagnosed the disease, from this it offers potential for detection of disease in the earlier stage for effectively treat the disease in simplest way through following steps[4],

1) Risk Assessment, 2) Prevention,
3) Detection, 4) Diagnosis,
5) Treatment, 6) Management.

Modern Advance Techniques in Personalized Medicine:

Modern advances in personalized medicine based on technology which confirms the patient's fundamental biology, DNA, RNA, or protein, which ultimately helps into confirms the disease[5].

1. **Genome Sequencing**: It shows mutations in DNA that influence diseases ranging from cystic fibrosis to cancer.
2. **RNA Sequencing**: It includes RNA molecules are involved with specific diseases. Unlike DNA, levels of RNA can change in response with the environment. Hence, sequencing of RNA can provide an understanding of a person's

gentamycin (38.8%), amikacin (26.9%), ceftriaxone (26.9%), ciprofloxacin(21.6%) and imipenem(0%).

Pseudomonas spp. in the present study has shown maximum resistance to ampicillin(100%) followed by Cefpodoxime (90.9%), Cefoxitin (90.9%), Ceftriaxone (72.7%) and Ciprofloxacin(63.63%). *Pseudomonas* spp. exhibited high sensitivity to amikacin (90.9%) followed by meropenem (80.81%) and imipenem (80.81%) in this study, where as it is amikacin (100%), ceftriaxone (100%) and Piperacillin/tazobactum (100%) in the study carried out by Imran Khan M et al. (2020). [14]

The resistance rates of Klebsiella spp were observed as ampicillin(100%), Cefpodoxime (100%), ciprofloxacin (90.9%), aztreonam (81.81%), cefoxitin(81.81%), cefepime (81.81%),
ceftazidime (81.81%), ceftriaxone (81.81%) and ofloxacin (72.72%) as shown in table 4.

The limitation of the present study was its duration. The applicability of the results of the present study to other hospital settings may be limited due to variations in antibiotic use, and infection control practices. The present situation is showing that many of the second and third line agents are turning to be ineffective in clinical settings because of mutation in bacterial or host genes. The slow pace antimicrobial new molecules introduced into the market inadequately is leading to increase in the thirst of antibiotics globally.[18] Therefore the present study recommends rational use of antibiotics, and implementation of measures to control the spread of resistant pathogens.

Table 4: Antibiotic resistance patterns. '0' indicates no resistance; '-' Indicates samples are not tested;

S.No	Antibiotics	*E.coli*		*Pseudomonas*		*Klebsiella*		*Citrobacter*	*Enterobacter*	*Proteus*
		MDR n= 32	XDR n=3	MDR n= 10	XDR n=1	MDR n=06	XDR n= 05	MDR n= 03	MDR n= 02	MDR n= 01
1	Cefoxitin	10	3	9	1	4	5	2	2	1
2	Cefepime	**31**	3	2	1	4	5	1	1	0
3	Ceftazidime	**30**	3	4	1	4	5	1	2	0
4	Ceftazidime/clavulanate	7	3	2	1	1	5	1	1	0
5	Cefpodoxime	**32**	3	9	1	**6**	5	3	2	1
6	Cefoperazone/sulbactam	5	3	4	1	0	5	0	2	0
7	Ceftriaxone	29	3	7	1	4	5	2	2	1
8	Piperacillin/tazobactam	6	3	2	1	1	5	0	1	0
9	Ampicillin	32	3	10	1	**6**	5	3	2	1
10	Amoxicillin/clavulanate	4	-	5	-	4	2	2	2	-
11	Ciprofloxacin	32	3	6	1	5	5	2	2	1
12	Ofloxacin	29	3	3	1	3	5	0	2	1
13	Gentamicin	14	3	2	1	1	2	1	1	0
14	Amikacin	3	3	0	1	0	3	1	0	0
15	Meropenem	1	3	1	1	0	4	0	0	0
16	Imipenem	1	3	1	1	0	4	0	0	0
17	Nitrofurantoin	1	1	3	1	1	3	0	2	1
18	Aztreonam	27	1	1	0	5	4	3	-	0
19	Cotrimoxazole	19	3	1	-	2	1	-	-	-

Conclusion:

E.coli followed by *Pseudomonas* and *Klebsiella* were found to be the most predominant community acquired MDR pathogens.

Conflict-of-Interest: None

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A Review: An Emerging Approach of Personalize Medicine in Health Care Industry

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ABSTRACT:

In the healthcare industry and medicinal field**,** Personalize Medicine is recent topic as new and novel so applied in the treatment as individualized as the disease. Basically, Personalize Medicine have greater approached towards increasing our ability to check medical therapy was safest or not for particular in all aged group patients. With the help of Personalize Medicines it is possible to detect an earlier stage of disease by increasing the use of existing biomarkers. It is mainly focus on understanding individual variability in disease prevention, care and treatment. Pharmacogenomics and Pharmacogenetics are basic component of the personalize medicine. A Pharmacogenetics and Pharmacogenomics is important tool for genetic basis understanding variable drug response in individual patient. Genes has main role in drug response and toxicity. Hence, personalized medicine known as novel approach in the drug delivery therapy, needed for to treat patient precisely and effectively, then avoid any allergic and adverse effects. In the treatment of personalise medicine, the human genome, chromosome, the genetic code, gene expression, DNA sequence and structure will be required for the depth studied about the patient disease. Personalise medicines more helpful to remove trial and error base treatment, so, less time consumption in patient's treatment and recover as soon as possible.

Keywords: Personalize medicines, Pharmacogenomics, Pharmacogenetics, Biomarkers.

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A Mini-Review on Solid Lipid Nanoparticles for Topical Delivery

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Summary
The investigations give an overview of the potential of Solid lipid nanoparticles for topical delivery and also discuss their excipients, method of preparation, drug release pattern. This paper discusses in detail their major investigation and research regarding topical delivery. Here we discuss the different therapeutic spectrum of their applications.

Keyword- Nanoemulsion, Solid Lipid Nanoparticles.

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Introduction

Topical drug delivery has a benefit to delivering the drug at skin such as skin surface. Solid Lipid Nanoparticles (SLNs) are consisting of well-tolerated excipients and because of their small particle size, simultaneously it will improve the adhesive properties on the skin. In 1991, Solid Lipid Nanoparticles are introduced in micron size range (50-1000nm), which are composed of physiological lipids, dispersed in water or an aqueous surfactant solution. As colloidal drugs carry, these have the advantages of polymeric nanoparticles and liposomes [1]. In comparison to emulsions & liposomes, incorporation of drug into the solid lipid matrix ensures better protection in the oily internal phase [2].

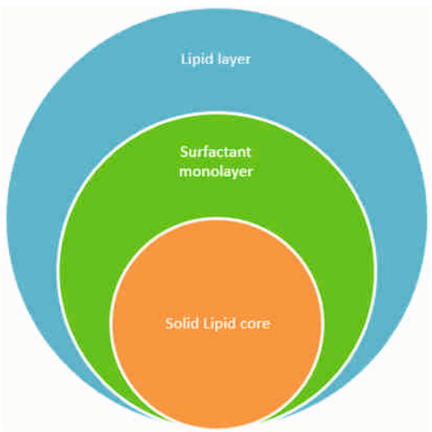

Figure 1. Structure of Solid lipid nanoparticles

Basic consideration of the skin to the topical drug delivery

For Topical drug delivery, the three major sites might be targeted

(a) Skin

(b) The deeper tissue for regional delivery

(c) Systemic circulation (transdermal delivery) [2]

Skin is a potential route for the delivery of nanoparticle. Nanoparticle delivery to the skin is increased to facilitate local therapies. The nanoparticles as defined by National Nanotechnology initiative has been adopted by the American National Standard Institute as particles with dimensions between 1nm & 100 nm [3]. The skin has the largest surface area of 1.8 – 2.0 m^2 and heaviest organ of the body with the weight of 5 Kgs (with blood). The thickness of skin is considered as 1.2 mm.

Solid Lipid Nanoparticles for topical delivery

SLN constitute as a lipid derivatives carrier system alternative for the topical drug delivery. SLN has several advantages including:

Drug targeting (site-specific) & the possibility of controlled drug release.

Improved drug stability.

Improved drug loading, incorporation of lipophilic & hydrophilic drugs.

High affinity to the stratum corneum & enhancement of the bioavailability of encapsulated materials [4].

SLNs are more suitable for topical application because of their advantageous features like they are composed of physiological and biodegradable lipids, which show low toxicity, nanoparticle size provides more effective surface area, which results in close contact to the epidermis and can enhance drug penetration. It will increase skin hydration that also contribute to increased drug penetration. Also, lipid nanoparticles can enhance the photo stability, protection against oxidation and hydrolysis.

Tretinoin loaded SLN developed by Shah et.al, the topical delivery of skin disease such as acne & epithelial skin cancer [20].

Psoriasis is a chronic inflammatory skin disorder. It is an immunological disorder manifesting as localized or widespread erythematous scaling lesions or plaques. There is excessive epidermal proliferation attended by dermal inflammation [19][21].

Clotrimazole loaded lipid nanoparticles developed by Souto et. Al. It shows antifungal activity [22].

Econazole nitrate loaded SLNs developed by Sanna et.al. The study of SLN promoted a rapid skin penetration of deeper skin layer [23].

SLNs improved NSAIDS topical administration

Non-steroidal anti-inflammatory drugs (NSAIDS) topically administrated to increase the local soft tissue & joint conception. Flurbiprofen loaded SLN were developed by Jain et.al. They showed the sustained drug release over 24 hrs. [24].

Aecelofenac loaded SLNs developed by Raj.et; al. is used in osteoarthritis, rheumatoid arthritis & ankylosing spondylitis [25].

SLNs as Sunscreens

There are two ways of action for sunscreen. Physical sunscreen such as micronized TiO_2 reflects, scatter, incoming UV-radiations. Wissing & Muller (2000), increased UV –blocking ability, had shown an in-vivo study that SLNs has excellent skin hydration ability [17].

Future perspective of SLNs for topical delivery

SLNs are an alternative drug delivery system which enhances the release pattern of drug and also improve the penetration of drug from the Stratum corneum. Their benefits demonstrate the new approaches to topical delivery. SLNs show a promising delivery system in treatment topical or dermal diseases such as psoriasis, arthritis, acne and eczema, etc.

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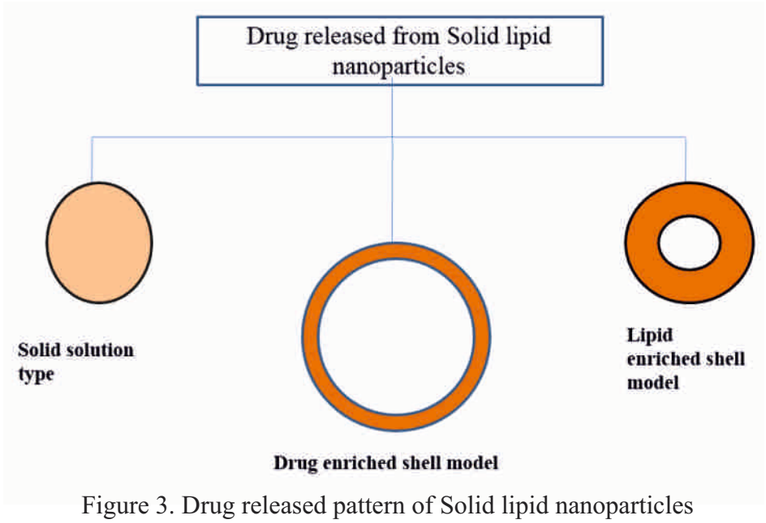

Figure 3. Drug released pattern of Solid lipid nanoparticles

The SLNs Type I or homogeneous matrix model

Type I model is produced by the cold homogenization method. It is derived from a solid solution of lipid and active ingredients. A lipid mixture can be produced containing the active in a molecularly dispersed form. After solidification of this mixture, it is ground in its solid-state thus avoiding or minimizing the enrichment of active molecules in various parts of the lipid nanoparticle.

The SLNs Type II or drug-enriched shell model was produced when hot High-Pressure Homogenization is used for the formulation of SLNs. In this model, the concentration of the active ingredient in melted lipids is low. During the cooling process, nanoparticles will form via precipitation of hot o/w nanoemulsion, leading to a slow increase in the concentration of the active molecule in the remaining melted lipid par, with an increasing fraction of lipid solidifies.

When the action reaches its saturation solubility in the remaining melt, an active free lipid core is formed and the outer shell will solidify containing both lipid and active.

The enrichment of active ingredients in the outer area of the particles causes burst release. By altering and controlling the production parameters, the percentage of active ingredient localized in the outer shell can be adjusted.

The SLNs Type III or drug-enriched core model can take place when the active ingredient concentration in the melted lipid is high or relatively closer to its saturation solubility. The solubility of the active in the melted lipid is diminished during the cooling process of the hot oil droplets, when the saturation solubility is exceeded, resulting the formation of active molecules by precipitation, so it will produce the drug-enriched core [1],[10],[15-17].

Some significant studies regarding the application of SLNs

SLNs in Eczema treatment

Halobetasol loaded SLN prepared by Bikkad et.al, used for skin condition e.g., Eczema, psoriasis, dermatitis, allergies & rash [7].

Prednicarbate loaded SLNs developed by Maia.et al, are used for epidermal targeting [18].

SLNs used for the treatment of Acne

For Acne Vulgaris SLNs can play a vital role in improving the topical delivery of anti-acne agents [19].

Occlusion effect on skin

SLNs would be forming films of densely packed spheres under the pressure applied and the spheres from a coherent film. A lipid film formation will be able to repair a damaged protective lipid film on the skin. A film can have an occlusive effect [1][5]. Therefore, on the application of SLN based cream, stratum corneum appears swollen and overall thickness is increased. [1]. An in vivo study reported that the SLNs containing o/w cream increases skin hydration, when compared with the conventional preparation. In this study, SLNs enriched cream and conventional o/w cream was investigated for skin hydration effect by applying it repeatedly for 28 days. SLNs containing o/w cream showed a significant increase in skin hydration effect compared to conventional o/w cream.

Formulation of Solid Lipid Nanoparticles

Solid lipid nanoparticles are the novel topical carrier systems for topical drug delivery. they are produced by 0.1% w/w-30%w/w high melting point lipids as a solid core having solid consistency at room temperature and the surface is coated with a surfactant which stabilizes the lipid system in an aqueous medium, i.e., the lipid particles matrix being solid at both room and body temperature. The lipids include triglycerides, partial glycerides, fatty acids, hard fats and waxes which are usually, physiologically compatible. Emulsifiers are well accepted for human use e.g., lecithin, and polyethoxylated monoglycerides. The active substance is distributed among the fatty acid chain of the glycerides. The mean particle size of the SLNs in the submicron range, ranging from 50-1000 nm [6].

The component used in the formulation of SLNs

Various excipients are used in the formulation of SLNs. are lipids materials, emulsifiers, co- emulsifiers and water.

Lipid

Lipid matrix has the following appropriate properties: crystalline, lipophilicity, loading capacity, melting point & purity of lipid are important factors [7]. It should be capable of producing small size particles (in nanometer size range) with low content of "μ" particles (>5μm). Also, possess sufficient loading capacity for lipophilic & hydrophilic drugs [8].

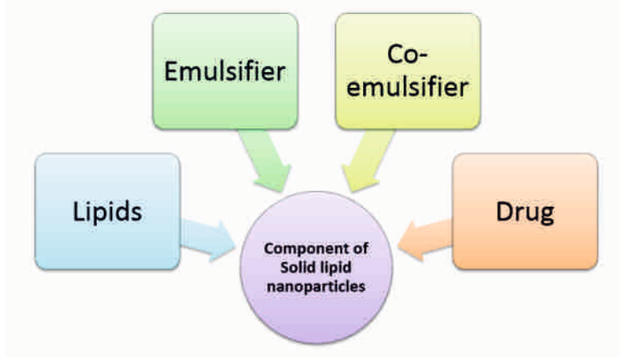

Figure 2. Components of Solid lipid nanoparticles

List of the lipids used for the preparation of SLNs

Triglycerides, Hard fat types Emulsifiers/co emulsifiers, Trilaurin, Witepsol (W 35, H 35, H42, E85), Soybean lecithin, Tristearin, Glyceryl monostearate, Egg lecithin, Trimyristin, Glyceryl palmitostearate, Phosphatidylcholine, Tripalmitin, Cetyl palmitate, Poloxamer (88,407,908), Tribehenin, Stearic acid, Polysorbate 20, 60, 80, Hydrogenated coco glycerides, Palmitic acid, Sodium glycocholate [8].

Selection of emulsifier

Nontoxic, compatible with other excipients, capable of producing the desired size with the minimum amount. Type & amount of emulsifier, method of preparation & sterilization by autoclaving may change the size of the particles & stability. Using the excess amount of emulsifier should be avoided to prevent the decrease in entrapment efficiency and burst release.

Selection of co-emulsifier

SLNs formulations use phospholipids, neither soluble in continuous phase nor they form highly dynamic micelles. Low mobility of the phospholipid molecules, increases particle size of SLNs [7].

Drug lipid solubility

This is the important parameter that decides the entrapment efficiency & loading capacity [7].

Long-chain glycosides with higher melting points are necessary for the formulations. Medium-chain glyceride shows the optimal solubilization of drugs in formulations. Greater solubility of drug in the formulation defines, that a drug exists not only in the oil phase but also in the interfacial area of lipid assembly [3].

Techniques for preparation of Solid Lipid Nanoparticles

High-pressure homogenization `

Micro-emulsion technique

Solvent evaporation technique

By Ultra sonication

Solvent- diffusion methods.

Solvent injection method.

Preparation by High-pressure homogenization

The high-pressure homogenization technique has a more reliable & powerful technique for SLN preparation to obtain particles with a mean diameter between 50-1000 nm.

There are the two methods for the development of SLNs

Hot homogenization technique

Cold homogenization technique [1].

Hot Homogenization Technique

Hot homogenization is carried out at temperature above the melting point and drug is dissolved or solubilized in the lipid. The molten lipid and drug contained mixture is dispersed under stirring in a hot aqueous surfactant solution. The pre-emulsion is homogenized using a piston-gap homogenizer, o/w Nano emulsion is cooled down at room temperature for recrystallization of lipid from SLN.

Cold Homogenization Technique

The first preparatory step is same as that of hot homogenization i.e., solubilization of drug in melted lipid. Drug-containing melt is cooled very rapidly (e.g., by liquid N_2 or dry ice) and grinded in a powder mill (50-100 µm particles) [using ball or mortar milling], dispersed in the cold aqueous medium. Then homogenized at room temperature or below to get Solid Lipid nanoparticles [8].

Microemulsion Techniques

Gasco has developed the preparation of SLNs via Microemulsion technique & this technique is based on the dilution of the microemulsion [8],[9].

This technique consists of micro emulsification of internal phase i.e., molten lipids (consist of fatty acids 10% molten solid lipid ,15% surfactant & 10% co-surfactant) and consequently dispersion of this microemulsion in aqueous phase with mechanical stirring at around 70˚C.

A formulated warm microemulsion is poured into cold distilled water (20-30 ˚C) which results in the formation of nanoparticles. These are washed twice with distilled water by ultrafiltration. After washing, formed suspension can be freeze-dried and purified (by centrifugation and dialysis) and are used for formulation [9],[10].

Drugs incorporated into system- steroids, anticancer drugs, antibiotics, ophthalmic, hydrophilic & lipophilic peptides [10].

Solvent Emulsification Evaporation Technique

Sjostrom and Bergen Stahl introduced a preparation method for the formulation of SLNs dispersions by solvent evaporation in o/w emulsions. Initially, the lipid part is dissolved in a water-immiscible organic solvent, such as chloroform, cyclohexane, methylene chloride, or ethyl acetate and further the drug is dispersed or dissolved in that solution for the production of drug enriched organic phase. This drug enriched organic phase is emulsified in an o/w surfactant-containing aqueous phase by mechanical stirring. Nanoparticle's dispersion is formed by the precipitation of the lipid in the aqueous medium by evaporating the organic solvent from o/w emulsion under reduced pressure and mechanical stirring. This method provides the advantages for thermolabile & hydrophilic drugs and avoids aid of heat during the preparation of SLNs [2] [9].

By Ultra sonication

This is a combination of high-speed stirring and ultra-sonication method. Although this method is performed at an elevated temperature for some time, the concentration of surfactant is low concentration is low (<1%) by this method [9].[11-13].

Double-emulsion technique

Usually, the encapsulation of hydrophilic drugs by using a double emulsion or inverse mini-emulsion system is used to reach satisfactory loading efficiency in solid lipid & polymer nanoparticles [14]. E.g., SLNs are a suitable system for encapsulation of hydrophobic compounds, therefore hydrophilic drugs encapsulated by double emulsion methods.

In this method, lipid is heated above its melting temperature. Then mixed with surfactants of low HLB under magnetic stirring. Then, hot water is added & sonicated to form the 1st emulsion.

Then, aqueous solution and surfactant was added to the 1st emulsion & mixture was homogenized forming the 2nd emulsion. The double emulsion was poured into water under mild magnetic stirring and lipid nanoparticles are solidified [14].

Solvent-injection method

This method was described by De Labouet et.al. In this method, polymeric nanoparticles are developed by dilution of polymer solution in water. Nanoparticles are developed into the aqueous phase (e.g., acetone, ethanol, isopropanol, and methanol) [8].

Drug Release From Solid Lipid Nanoparticles

Drug release of drug penetration across the skin membrane can also be achieved as the creation of a super saturation system. The system can be created by the incorporation of lipid nanoparticles into the topical formulations (creams, ointment emulsion & gels) [15].

At present there are three different models of internal SLN structure [1] [15].

1. Type I or Solid containing shell (Homogeneous matrix) model
2. Type II or Drug-enriched shell model
3. Type III or Drug-enriched core model