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A Study to Assess the Effectiveness of Structured Teaching Program on Knowledge Regarding Umbilical Cord Stem Cell Therapy among Health Care Professional Students

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Abstract: ***Umbilical cord stem cell therapy involves using stem cells from umbilical cord blood or tissue to treat various medical conditions. These stem cells have the potential to differentiate into different types of cells, which can aid in repairing damaged tissues and organs, as well as modulating the immune system. It's been explored for a range of conditions including blood disorders, autoimmune diseases, and neurological disorders.However, while it shows promise, its effectiveness and safety are still being researchedand evaluated through clinical trials.***

Umbilical cord stem cell therapy utilizes stem cells derived from umbilical cord bloodor tissue for medical treatment. These stem cells possess the unique ability to differentiate into various cell types, offering potential therapeutic benefits for a wide range of medical conditions. Research and clinical trials have shown promising resultsin treating blood disorders, autoimmune diseases, neurological disorders, and more. However, further studies are required to fully understand its efficacy, safety, and long-term effects.

Quantitative research approach was adopted for the study. Health care professional students are taken for the study by Purposive sampling technique. Pretest and Post-testknowledge of health care professional students were assessed by structured knowledgequestionnaire. Analysis done by descriptive and inferential statistics. The result showsthat mean posttest knowledge score (10.6) was highly significant than pretest knowledge score (7.2). The calculated t value (t=8.98) was higher than the table value (t=2.00) at 0.05 level of significance. It confirms that the education was effective in increasing the knowledge of health care professional students. Conclusion; the structured teaching programme was effective in improving the knowledge of healthcareprofessional students of St. James college of pharmaceutical science, Chalakudy.

Keywords: Effectiveness, Structured Teaching Programme, Health care professional students, Umbilical Cord, Stem cell therapy.

I. INTRODUCTION

"It's not just about saving blood…it's about saving lives"[1]

Stem cells have an interesting history that has been somewhat tainted with debate and First reports on the presence of stem cells in human cord blood has been reported in 1974[2].In 1983 Dr.HalBroxmeyer and Colleagues are the first to propose the concept ofusing umbilical cord blood as an alternative source of stem cells to bone marrow for transplant[3]. Dr.Eliane Gluck man of St. Louis hospital Paris the first successful cord blood transplant in the world is performed in France on 5 year old boy suffering from "fanconi's anemia" in 1988[4]. In 1990 World's first cord blood transplant for the treatment of leukaemia is performed. In 1993 World's first unrelated cord blood transplant is Performed and in 2004 Illinois becomes first state to enact legislation supportive of cord blood[5]. In 2004-05 Researchers confirm that pluripotent stem cells are present in cord blood. This indicating the possible use of cord blood for the treatment of diseases other than those of blood origin[6].In 2008-12,000 cord blood stemcell transplants have been performed worldwide and Cord blood is being used in the treatment of 80 life-threatening diseases[7].

Stem cells are the next frontier in medicine. Stem cells are thought to have great therapeutic and biotechnological potential. This will not only to replace damaged or dysfunctional cells, but also rescue them and/or deliver therapeutic proteins after they have been engineered to do so. Currently, ethical and scientific issues surround both embryonic and fatal stem cells and hinder their widespread implementation.

In contrast, stem cells recovered postnatally from the umbilical cord, including the umbilical cord blood cells, amnion/placenta, umbilical cord vein, or umbilical cord matrix cells, are areadily available and inexpensive source of cells that are capable of forming many different cell types i.e., they are "multipotent"[8].

Stem cells are defined simply as cells meeting three basic criteria first, stem cells renewthemselves throughout life, i.e., the cells divide to produce identical daughter cells andthereby maintain the stem cell population. Second, stem cells have the capacity to undergo differentiation to become specialized progeny cells

When stem cells differentiate, they may divide asymmetrically to yield an identical celland a daughter cell that acquires properties of a particular cell type, for example, specific morphology, phenotype, and physiological properties that categorize it as a cellbelonging to a particular tissue

Stem cells that may differentiate into tissues derived from all three germ layers, for example, ectoderm, endoderm, and mesoderm, are called "pluripotent." The bestexample of pluripotent stem cells are the embryonic stem cells (ESCs) derived from theinner cell mass of early embryos. In contrast with ESCs, most stem cells that have been well characterized are multipotent, i.e., they may differentiate into derivatives of two of the three germ layers. The third property of stem cells is that they may renew the tissues that they populate. All tissue compartments contain cells that satisfy the definition of stem cells.

And the third criteria, the rate at which stem cells contribute to replacement cells variesthroughout the body. For example, blood-forming stem cells, gut epithelium stem cells,and skin-forming stem cells must be constantly replaced for normal health. In contrast, the stem cells in the nervous system that replace neurons are relatively quiescent and do not participate in tissue renewal or replace neurons lost to injury or disease[9].

In the last 10 year, umbilical cord blood has been shown to be therapeutically useful forrescuing patients with bone marrow-related deficits and inborn errors of metabolism. Umbilical cord blood offers advantages over bone marrow because cord blood does not require perfect human leukocyte antigen (HLA) tissue matching, has less incidence of graft vs host disease, and may be used allogenically.

In addition, cord blood may be banked, and thus is available for use "off-the-shelf." Last year, a federally supported program was established to expand the nationalumbilical cord blood banks to include a wide sample of HLA types. By 2004, there were more than 6000 cord blood stem cell units banked. As of January 2006, it is estimated that there are about 300,000 units in public and private banks in the United States.

This study is to assess the effectiveness of structured teaching programme on knowledge regarding umbilical cord stem cell therapy among healthcare professional students in selected colleges at Thrissur district[10].

A. Need for The Study

Research on umbilical cord stem cell continuous to advance knowledge about how an organism develops from a single cell and how healthy cell replace damaged cells. Umbilical cord cells offer new potentials for treating diseases such as diabetes and heartdiseases[11].

Different studies have shown that cord blood have various benefits over bone marrow transplantation mostly in children, and can be lifesaving in rare cases where some bone marrow donor cannot be found.

According to WHO more than 70 malignant and non-malignant diseases are cured withstem cell transplantation. So, this intervention has more useful for other diseases specially in leukemia and lymphoma patients. At present there are at least 3 public and7 private cord blood banks in India[12].

The Hindu (September 2010) newspaper reported that 1500 stem cells are received every month in India. Approximately 50% of patients receiving a bone marrow transplant will not find a suitable donor with a critical period[13].

Studies have proved that cord blood cells can also be used for siblings and other members of the family who have a matching tissue type. Siblings have up to 75% of chance of match and cord blood may even be a match for parents and grandparents[14].

The investigations in their personal experiences found that may of the students havingno idea about the stemcell therapy[15].

Students need to hold a proper knowledge and attitude regarding stem cell therapy through appropriate education during their course of study[16]. This medical innovation is recent and students are challenged to integrate knowledge and attitude related to newly developed concept in clinical practice[17].

Hence further the investigations personally felt the need to developing a structured teaching program to healthcare professional students[18].

B. Statement Of The Problem

"A study to assess the effectiveness of structured teaching program on knowledge regarding umbilical cord stem cell therapy among health care professional students in selected colleges at Thrissur district".

C. Objectives Of The Study

1) To assess the pre and posttest knowledge on stem cell therapy among healthcare professional students.
2) To evaluate the effectiveness of the structured teaching program on knowledgeregarding umbilical cord stem cell therapy healthcare professional students.
3) To find association between pretest knowledge score regarding umbilical cordstem cell therapy with their selected demographic variables.

D. Operational Definition

1) Assessment

The whole evaluation of an activity .

2) Effectiveness

Effectiveness refers to the extent to which the structured teaching program has achievedthe desired effect as expressed by gain in knowledge score.

3) Structured Teaching Programme

Systematically developed instructional and teaching section prepared by researcher to impart knowledge . It includes introduction ,history, definition, indication, contraindication, procedure, advantage, disadvantage, complications, recapitulation, conclusion, bibliography.

4) Umbilical Cord Stem Cell Therapy

Umbilical cord stem cell therapy refers to treatment given by using the stem cell to replace the damaged tissue to treat the disease.

E. Hypothesis

1) H1 – There is significant difference in pretest and posttest knowledge scores regarding umbilical cord stem cell therapy among health care professional students
2) H2- There is significant association between pretest knowledge scores with theselected demographic variables.

F. Conceptual Framework

Conceptual frame work is a theoretical approach to the study of the problem that are scientifically based and emphasis the selection, management and classification of its concepts.

The conceptual frame work is usually constructed by using researchers own experience, previous research findings, or concepts of several theories or models.

The overall purpose of frame work is to make scientific findings meaningful and generalized. It provides certain framework of reference for clinical practice, research and education. Frame work can guide the researcher's understanding of not only the "what" of natural phenomena, but also the "why" of their occurrence. They also give direction for relevant questions to practical problems[19].

Frame work is used to guide implementation of research, particularly in planning and constructing strategies and selecting tools often used in an implementation process or interventions to promote evidence- based best practice. The conceptual frame work used in the study in based on the general system theory. It was developed by Ludwig Von Bertalanffy (1968) and modified by J. W. Kenney and is said to be open system model. It helps to provide general explanation of the relationship between the concepts of research study27. According to system's theory a system is a group of elements thatinteract with one another in order to achieve the goal. An individual is a system, becausehe/she receives input from the environment. This system is cyclical in nature and continues to be, as long as the input, process, output and feedback keep interacting. If there are changes in any parts, there will be changes in all the parts. Feedback from within systems or from the environment provides information which helps the system to determine whether it meets its goal.

The following elements are common to the system:
Input- Matter energy and information received from the environment.
Process -Matter energy and information that is modified and transformed within theSystem.
Output- Matter energy and information that is released from the system in to theenvironment.
Feedback – Information regarding the environmental responses used by the system inthe present study the concept can be explained as follows:

1) Input

An adult is a system and has input within the system itself. In this study, health care professional students are system with input from self and acquired from the environment.
The input is a structured teaching programme and it's influenced by education, etc. Pretest is administered system. Structured teaching programme regarding umbilical cord stem cell therapy in the form of input to change the knowledge of health care professional students for better performance.

2) Process

Process refers to the action needed to accomplish the desired task. To achieve the desired output i.e., to evaluate the effectiveness of structured teaching program regarding umbilical cord stem cell therapy. Input absorbed by the system is processed to form an output. The information regarding umbilical cord stem cell therapy is giventhrough the scheduled structured teaching programme. Audio visual aids like power point is used to make teaching more effective and efficient. To achieve the desired output the following processes are carried out:

- Review of literature
- Opinion of experts
- Preparation of the tool
- Administering structured knowledge questionnaire(pre-test)
- Administration of structured teaching programme.
- Assessment of knowledge through post-test.

3) Output

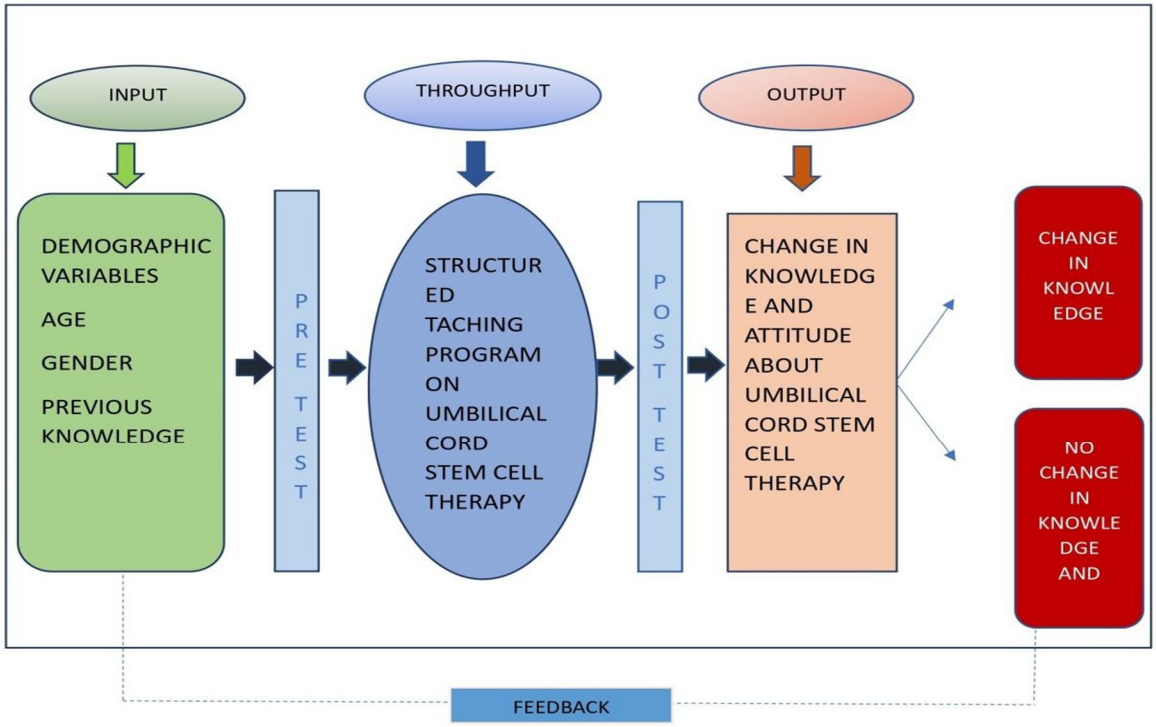
In the present study, evaluation of effectiveness of structured teaching programme as the output may also be regarded as the product of the process. This is achieved through a comparison between mean pre-test and mean post-test knowledge score. The output decides the modification to be done at the input and processing levels. The increased post- test scores are an indication of effectiveness of structured teaching programme.

4) Feedback

It is the process that provides information about system's output and its feedback as input. The outcome is measured in terms of the differences in the scores achieved through pre and post-test. Accordingly, the higher knowledge score in the post-test indicate that structured teaching programme is effective in improving the knowledge inhealth care professional students. A low score in post–test indicates the need for repeating or modifying administration of structured teaching programme or evaluating the inputs like administration of learning setting sample or pre-determined influence offactors within the subjects. The investigator has not assessed the feedback in this study[20].

CONCEPTUAL FRAME WORK

SYSTEM THEORY



II. REVIEW OF LITERATURE

A literature review is a type of academic writing that provides an overview of existingknowledge in a particular field of research. A Review of literature is one of the most important steps in the research process. Literature review summarizes, analyses, evaluates and synthesizes the relevant literature within a particular field of research. Itilluminates how knowledge has evolved within the field, highlighting what has alreadybeen done, what is generally accepted, what is emerging and what is the current state of thinking on the topic. Additionally, literature reviews identify the gaps in the currentknowledge - that is, uninvestigated or under-researched areas[21].

Review of literature is defined as "broad comprehensive, in depth, systematic and critical review at scholarly publication, unpublished scholarly print materials, audiovisual materials and personal (Polit and Beck)[22].

Literature review is a written summary of journals, articles, books, and other documents that describe the past information on the topic of research. This prevents reliance on one research study that may not be in accordance with findings from other studies. Research studies are usually undertaken within the context of an existing knowledge base, because research cannot be conducted in an intellectual vacuum. Before starting any research, a literature review of previous studies and experiences related to be proposed investigation has to be done. The investigator analyzed and reviews the related literature of the present study to gain insight and knowledge relatedto selected problem under study. The literature review of present study organized and presented under following subheadings:

A. Studies related to knowledge regarding umbilical cord stem cell therapy.

This session deals the literature related to knowledge regarding umbilical cord stem celltherapy.

1) A quasi experimental study was conducted by JayashreeAjith, Linie Thomas on Effectiveness of Structured Teaching Programme (STP) on Knowledge Regarding Stem Cell Therapy and its Importance among Nursing Students of PG College of nursing, Gwalior, Madhya Pradesh in 2019. A quasi-experimental design with evaluative approach was adopted. A total sample of 60 nursing students was selected in the study. The result reviewed that post-test knowledge scores shows a significant difference from that of pre-test, i.e. 2 (6.66%) were having very good knowledge, 26 (86.66%) gained good knowledge and only 2 (6.66%) of them were average knowledge[23.]

2) A descriptive study was conducted by ReetuHanglem, Dr LaishramDabashini Devi in Staff nurses who working in Sagar hospitals Bangalore in 2020 on Effectiveness of Structured Teaching Programme on Knowledge Regarding Cord Blood Banking. The sample size was 50. The data collected by questionnaire and STP. The results of the study revealed that the fixed mean score was 19.26 (55.03%) with 3.161. The study reveals no significant correlation between selected demographic variables such as age,gender, professional competence, work experience, prior knowledge and resource. Knowledge correlated with the knowledge scores of staff nurses at P> 0.05. The studyconcluded that the knowledge of staff nurses regarding cord blood banking improved after the structured teaching program[24]

3) A quasi experimental study was conducted by Hend S. Mohammed and Hend A. EL Sayed in labour unit of obstetrics department at Benha University Hospital and Maternity Hospital at Zagazig University Hospital in 2015 on knowledge and attitude of maternity nurses regarding cord blood collection and stem cells. A total sample of 53 maternal staff nurses were participated in the study. Data were collected through twomain tools: A structured interviewing questionnaire and nurses attitude toward cord blood collection and stem cells. The results revealed that 88.7% of nurses had poor knowledge before intervention. However, 90.6% had good knowledge immediately and81.2% of them had good knowledge after three months of intervention respectively. Only 1.9% of the studied nurses had positive attitude toward cord blood collection and stem cells before intervention. The result showed that tremendous change in positive attitude towards the stem cell therapy that is. positive attitude changed to 66.0% and 69.8% respectively[25].

4) A descriptive study was conducted by Manal Farouk Moustafal&Entisar Mohammad Youness in Women's Health Hospital, Assiut University, Egypt in between October 2014 and January 2015, based on Knowledge about Umbilical Cord Blood Banking and its Barriers. The Sample was 150 maternal nurses of Obstetrics &Gynaecological Nursing Department. The data were collected in interviews by using an interview formdeveloped by the researchers. The results show that nurses' Knowledge about UCBB islacking, inadequate knowledge represented 79.7%. The study concluded that, Nurses' level of knowledge on UCBB is inadequate and this indicates the necessity of creationof educational programs and continual training with the use of UCBB[26]

5) A quasi experimental study was conducted by AmeraBekhatroah Awed Allah Rashed, HanadyShabaan Ibrahim Shehata in faculty of nursing. Menofia, Egypt in 2017based on evaluation of pregnant women's knowledge and attitude toward banking of stem cells from the umbilical cord blood before and after counselling. The participants are 100 pregnant women. The data collected by interviewing questionnaire, women's knowledge assessment sheet and women's attitude scale. The result shows that the women (88.7%) had poor knowledge level before counselling However, after counselling the majority of women (68.6%) had good knowledge level[27]

6) A cross sectional study was conducted by D Kaitelidou et al, to assess knowledge and attitude towards the Umbilical Cord Blood donation among health professional in Greece 2014. The study was conducted from April 25th 2012 to May 7th 2012. The sample consisted of 109 Health Professionals from 3 provincial hospitals and 2 hospitals in Thessaloniki. In order to collect the data, a questionnaire was used. From the 130 questionnaires sent, 109 were completely answered (response rate 84%). The participants were, 23.9% were physicians, 34.9% were midwives, and 34.8% were nurses. The result shows that, the Health Professional's knowledge on the Umbilical Cord Blood is concerned, only 15.6% of the participants declared to be quite or well informed on the collection methods and the usage of Umbilical Cord Blood. The vast majority of the participants (89%), declared that a well-organized program on acontinual training is very essential. 93.5% of the participants declared that in the last 5years received no or very little training regarding the collection, storing and transplantation of Umbilical Cord Blood"[28].

7) A study was conducted by Lowdermilk DL, Perry SE in 2007 to determine pregnant women's knowledge and attitude towards placental stem cells and their banking. The sample consisted of 334 pregnant women during routine prenatal visits. Data were collected in an interview. At the end of the study, it was revealed that the majority (86.6%) of the participants had a lack of knowledge about stem cells and placental stem cell banking and wanted information from media. The majority (78.2%) also wanted tostore their infants placental and cord blood and stated that they would be more likely tochoose a public cord blood bank The study concluded that those giving antenatal and prenatal care need to offer a accurate and scientific counselling services on this subjectsto parents who need to be informed[29].

8) A cross sectional study was conducted by Suat Cheng TAN et al, on Knowledge and Attitude about Stem Cells and Their Application in Medicine among Nursing Studentsof university saints Malaysia in 2015. A cross-sectional study (n = 88) was conducted using self-administered questionnaire consisted of demographic information, stem cells knowledge and attitude statements. Results of the study shows that the majority of participants (92%) had moderate knowledge score about stem cells. Many students (33%) worried that stem cell application might cause a harm to humanity yet had a positive (76.1%) attitude towards its therapeutic potential (45.5%). Poor correlation between knowledge and attitude (r=0.08) indicated that acceptance

towards stem cell is not solely based on the knowledge level but also on other factors including religion and culture[30]

9) A pre experimental research design was conducted by Dolly Saraswat, Hari Mohan Singh. In 2021 on Effectiveness of Structure teaching programme on knowledge regarding Umbilical cord stem cell therapy among staff nurses in Apollo hospital at Gandhinagar, Gujarat. 40 samples were selected using purposive sampling and structured questionnaire was used for data collection. The findings revealed that the mean post-test knowledge score 15.91 was greater than the mean pre-test scores 12.37. The mean difference between pre-test and post-test scores was 3.54; the't' value 6045 was significant at 0.05 level[31]

10) A non experimental descriptive research study was conducted by AksaPeter, AngelMaria, AnietBijo, Ani Rose Thomas, to assess the knowledge among student nurses regarding umbilical cord stem cell banking of selected Nursing colleges in Kerala 2017.The samples are 100 student nurses and the data collected by questionnaire. The result shows that only 1% of students had poor knowledge, 76% had moderate knowledge and23% had poor knowledge about umbilical cord stem cell banking[32]

11) A pre experimental study was conducted by Singh T. PakhideV, Verma M in Chirayu medical college and hospital in Bhopal 2019 on to assess the effect ofeducational package on knowledge regarding hematopoietic stem cell transplantation among staff nurses working in selected hospital. Total sample of 60 staff nurses and the data collected through structured knowledge questionnaire. The result revealed that in pre test no one had adequate knowledge, whereas 40% had inadequate knowledge and 60 per cent of the population had moderate knowledge. From the post- test analysis it is evident that, 55% of the students were aware of stem cell therapy and 40 per cent ofthem had moderate knowledge. The percentage of the population with inadequate knowledge brought down to a level of 5%[33].

12) A cross sectional study was conducted byyesikar, V., Banseria, R., Dixit, S., &Shivram in Veena Yesikar, Associate Professor, Department of Community Medicine, MGM Medical College, Indore, Madhya Pradesh, India RuchitaBanseria, Resident, Department of Community Medicine, MGM Medical College, Indore, Madhya Pradesh, India, Sanjay Dixit, Professor & Head, Department of Community Medicine, MGM Medical College, Indore, Madhya Pradesh, India,GeetaShivram, Demonstrator, Department of Community Medicine, MGM Medical College, Indore, Madhya Pradesh, India In 2016 to assess the knowledge regarding stem cells and its transplantation among students from various colleges & women from ane clinic in Indore. The samples are 80 undergraduate medical students & 80 non-medical students and 40 Antenatal mothers and the data collected by Structured Questionnaire. The resultrevealed that the medicos i.e. 87.5% and non-medicos i. e. 63.75% believed that stem cell transplant can be a therapy for majority of chronic illnesses, Antenatal mothers 22.5% recollected stem cell banking and 17.5% it as a medical procedure, 72.5% believed that stem cell transplant can be a therapy for majority of chronic illnesses like Anaemia, Thalassemia and Cancer. 50% Antenatal mothers also believed in preserving it. More than 80% of medical students considered it to be a life saving procedure[34]

13) A cross sectional study was conducted by Sibel et al on knowledge and attitude about cord blood and cord blood banking in Turkey 2017. The samples are 322 mothers between ages of 18 and 49 years in health centres of turkey. It was found out that 29.8% of mothers knew about cord blood and stem cells 75.4% of mothers do not know about cord blood banks and 21.1% learned about these issues from internet and other mass media. It was also found that knowledge level of mothers increased and their attitudes got better in accordance with their educational status[35].

14) A exploratory study was conducted by Savita et al on knowledge of antenatal mothers regarding cord blood banking in Punjab 2015 where 200 antenatal mothers were selected by purposive sampling technique. Data is collected by a questionnaire revealed that majority 55% of mothers had average knowledge regarding cord blood banking 26.5% had below average knowledge mean % score was highest 45.63% in advantages and disadvantages and least in general information. Hence, it is conducted that there is a need to enhance the knowledge of antenatal mothers by means of pamphlet [36]

15) A study was conducted by Maiyan et al (2011) in China on factors that influence a mother's willingness to preserve umbilical cord blood. Surveys of 5120 Chinese mothers with average age of 26.1±8.4 years were included in the study. The results showed that first time mothers showed greater willingness to preserve their umbilical cord (73.3%) compared to those having their second (48.9%) and third child (40.3%). Mothers who were employed at government agencies and organizations were more willing to preserve their umbilical cord blood (87.3%) than those employed in factories (62.0%) and those who are unemployed (27.3%). Mothers holding masters degree were more willing to preserve then umbilical cord blood (72,5% and 71.1% respectively) than mothers with high school diplomas (48.7%) on those who only went to preliminary school or middle school (40.7%). The results showed that mothers with higher education on those having better occupation are more likely to preserve their umbilicalcord blood in china[37]

16) A prospective open study was conducted by Surbek DV. et al in the university of Basel women's hospital pregnancy outpatient clinic, Germany, in 2006 to estimate the acceptance of cord blood donation among pregnant mother. 300 questionnaires were

handed out to pregnant women of different ethnic background, 250 (83%) returned and245 was evaluated for final analysis, only 40% indicated that they did know what usually happens to the placenta after birth, 95% stated to donate cord blood for their own child for their purpose. The study concluded the high acceptance of umbilical cord blood donation and stem cell transplantation among pregnant women[38.]

B. Studies related to the practice of umbilical cord stem cell therapy

1) A quasi experimental study was conducted by Lei Shu, ChangmingNiu, Ruyou Li and Tingrong Huang at Huangshi Hospital of Traditional Chinese Medicine in Hubei Province on Treatment of severe COVID-19 with human umbilical cord mesenchymal stem cells from Feb 12 to March 25, 2020. .A total of 12 patients were enrolled in the hUC-MSC treatment group, and 29 patients were enrolled in the control group This study was a single-center open-label, individually randomized, standard treatment- controlled trial. The result reveals that half of the patients (58.33%) in the hUC-MSC group had symptom relief, 66.67% of patients did not require supplemental oxygen: however, only 5 patients (17.24%) in the control group felt relief, and 3 patients (10.34%) did not receive oxygen supplementation. At day 14, 11 patients (91.67%) experienced obvious clinical symptom improvement in the hUC- MSC group that means as a noninvasive treatment, hUC-MSC therapy is a very effective and promising method for clinical application and promotion at the current critical moment due to the lack of effective approaches to treat severe COVID-1939[39].
2) A meta analysis study conducted by Dina.H.Kassem, Mohamed M. Kamal in 2020based on therapeutic efficacy of umbilical cord-derived stem cells for diabetes mellitus.The clinical efficacy was evaluated based on glycemic control status (reflected on HbA1c%) and ß cell function (reflected on C-peptide levels), as well as the daily insulin requirement in diabetic patients after receiving UC-derived SC- transplantationcompared to baseline values. Eleven eligible clinical studies were included; WJ-MSCs (6 studies; 172 patients including 71 controls) and UCB (5 studies; 74 patients including15 controls). The result showed that WJ-MSCs (6 studies; 172 patients including 71 controls) and UCB (5 studies; 74 patients including 15 controls), WJ-MSCs significantly improved HbA1c% (pooled-estimate 1.085; 95%CI (-1.513,-0.657); p<0.001) and C-peptide levels (pooled-estimate 1.008)[40]
3) A retrospective cohort study conducted by Wuhan hospital from 2009 to 2012 on Human umbilical cord blood mononuclear cell (hUCMNC) therapy is a Promising treatment for ischemic stroke. Ninety-seven subjects with ischemic and Hemorrhagic stroke, treated with hUCMNCs in the Wuhan Hongqiao Brain Hospital Co., Ltd. (Wuhan, Hubei) between March 2009 and March 2012, were included in the retrospective cohort Study. Analysis of post-stroke symptoms before and after treatment showed improvement of upper and Lower extremity mobility and muscle strength, and neurological function (ability to speak, urinary And bowel function). Upper extremity mobility for 87%, Lower extremity mobility for 67%, Neurological function (ability to speak) for 63%, Upper extremity muscle strength for 88%, Lower extremity muscle strength for 82%. Neurological function (urinary and bowel Function)for 69% improvement"[41].
4) A randomized controlled clinical trial was conducted by Jian Zhang ,SameiLv, XiaojingLiu, Bin Song, Liping Shi atShaanxi Provincial People's Hospital, China, fromJune 2012 to June 2015.On Umbilical Cord Mesenchymal Stem Cell Treatment for Crohn's Disease. In the UC-MSC group, there were 24 men and 17 women, with an average age of 34.3 years (range, 21 to 44 years). In the control group, there were 26 men and 15 women, with an average age of 32.7 years (range, 20 to 41 years). The result shows that after the 12 month of treatment, the CDAI, HBI, and corticosteroid dosage had decreased by 62.5+23.2, 3.4±1.2, and 4.2+0.84 mg/day, respectively, in the UC-MSC group and by 23.6±12.4, 1.240.58, and 1.240.35 mg/day, respectively. in thecontrol group. It showing that UC-MSC therapy can significantly and safely improve disease condition in patients with CD receiving a stable steroid dose[42]
5) A quasi experimental study was conducted by Brian M. Mehling, Louis Quartararo,Marine Manvelyan, Paul Wang' and Dong-Cheng Wufrom Blue Horizon International, LLC, 214 State Street, Hackensack, New Jersey 07601, USA, Biochemistry Institute, Wuhan University, Hubei 430071, P.R. China. Departmentof Stem Cells, Wuhan Hongqiao Brain Hospital, Wuhan, Hubei 430071. P.R. Chinain one of the hospital in United States regarding the treatment effect and safety of intravenous therapy with human umbilical cord blood derived mononuclear cells in subjects with chronic inflammation. The total sample of 100 patients with chronic inflammation was includedin the study. A structured questionnaire was used in this study to assess the effect and safety of intravenous therapy with human umbilical cord blood mononuclear cells. Results are showed that human cordblood stem cells were safe and effective in the improvement of symptoms related to chronic inflammation. The subjects displayed a significant increase in energy level as well as a significant decrease of their pain level.The result showed that the patients with improvements and no changes in blood work markers were 76.8 % and remaining 23.3% patients had

deterioration. The result also showed that three and six months after stem cell therapy display a significant increase in energy level from 57.9 to 76.1 as well as a significant decrease of their pain level from 63.3 to 87.943[43].

6) A cohort study was conducted by AhmadshahFarhat, Anahita Majma, Farah Ashrafzadeh, JavadAkhondian, Ashraf Mohammadzadeh, Ali Ghasemi on TherapeuticPotency of Cord Blood Stem Cells in Patients with Cerebral Palsy in Iran. A total of 165 patients with cerebral palsy had been studied in the included studies. The populations of the studied articles were children with the mean age of 57.76 months (age range: 6months to 20 years). These patients received an average of 13.33 months of treatment and follow-up care. However, the duration of treatment varied from 4 weeks to 28 months among the included studies. The number of studied patients variedfrom 2 cases of poliomyelitis to 96 patients in a randomized double- blind clinical trial.Of these patients, 95 were male. The result reveals that Patients with cerebral palsy often suffer from behavioural and functional impairments. In the included studies, patients were treated with embryonic cord blood stem cells. The results revealed that the efficiency of this type of treatment varied among the studies. but in all of these studies, brain function improvement and neurodevelopment evaluation were reported after injections of fetal cord blood stem cells. The results of these studies also presented a significant improvement in cognitive impairment andcerebral dysfunction after treatment with cord blood stem cells. Therefore, according to the data obtained in this study, cord blood stem cells can be considered as an effective therapeutic strategy in the treatment of patients with cerebral palsy"[44].

7) A prospective study was conducted by Lopez m et al to analyze the umbilical cordblood characteristics of umbilical cord blood units from preterm deliveries and comparethem to full term deliveries in the La Fe University Hospital in Valencia in 2009. A comparative study was conducted between preterm deliveries and full term deliveries.The sample size was 194 patients. The cases were grouped according to the gestationalage: between 25 and 33 weeks (group 1), between 34 and 37 weeks (group 2) and between 38 and 42 weeks (group 3). Among obstetric variables, only arterial pH and maternal age variables were similar for all the groups. Higher CD34 (+) cell counts were observed in the group 2, while the clonogenic efficiency was higher for the mostpreterm deliveries. The study concluded that umbilical cord from preterm deliveries contain higher CD34 cell content than umbilical cord blood units from full term deliveries[45]

8) A single-arm study was conducted by lameicheng Wang, Cong pengin Korea regarding efficacy of human umbilical cord mesenchymal stem cells for psoriasis in Xiangya hospital central south university on march 2019 in china A total of 18 Patients were enrolled and received UMSCT,of which 17 patients completed UMSC infusions according to the clinical Protocol and one patient discontinued the treatment The resultshowed that total of 47.1% of the psoriasis Patients has at least 40% improvement in the PASI score, and 17.6% has no signs of disease or minimal disease based on PGA score. And the efficiency was 25% for males, and 66.7% for females"[46].

9) A prospective study was conducted by ossama samara, hananjafar, muhammadhamdanet! in university of jordan, amman regarding ultrasound guided intraarticular injection of expanded umbilical cord mesenchymal stem cells in knee osteoarthritis. 16 Patients with advanced kelagrea stage were treated using 2doses of expanded WJMSCs given one month apart. The result showed that one patient developed moderate effusion and One superficial phlebitis. Observed functional and pain improvement at 12&48months, with statistically significantly improvement in MRI Scan at 12months in cartilage loss, osteophyts, bone marrow Lesions[47.]

10) A retrospective cohort study was conducted at the Wuhan Hongiao Brain Hospital between March 2009 and March 2012 regarding umbilical cord blood mononuclear cell therapy for spinal cord injury. A total sample of 30 patients with spinal cord injury wasrandomly selected from the 70 Patients who were treated with human umbilical cord blood mononuclear cells at the same hospital. Another 30 patients with spinal cord injury, who received only traditional therapy and no stem cell therapy, were included as the control group. The pretest post-test method was used in this study to assess the effect of umbilical cord blood mononuclear cell therapy for spinal cord injury and the comparison made between the experimental group and control group after Intervention.The result showed that the patient who received the stem cell therapy had a cure rate of63.3% and the patient who received only the conventional therapy had the cure rate of36.7% [48]

11) An experimental study was conducted by Liming Wang, Shigao Huang, and Yongjun Liu in Korea regarding Efficacy and Safety of Umbilical Cord MesenchymalStem Cell Therapy for Rheumatoid Arthritis Patients. A Prospective Phase I/II Study. study conducted in anti-inflammation disease-modifying anti-rheumatic drugs (DMARDs) have limited therapeutic effects in rheumatoid arthritis (RA) patients and it was64 RA patients aged 18-64 years. The result shows that Iyear and 3 years after UC-MSC cells treatment, the blood routine, liver and kidney function andimmunoglobulin examination showed no abnormalities, which were all in the normal range. The ESR, CRP, RF of 1 year and 3 years after treatment and anti-CCP of 3 yearsafter treatment were detected to be lower than that of pre treatment, which showed significant change ($P < 0.05$)[49].

12) A Clinical observation of umbilical cord mesenchymal stem cell treatment of severe idiopathic pulmonary fibrosis was conducted by ChunyuZhang.A 56-year-old Chinese man was diagnosed with idiopathic pulmonary fibrosis (IPF). A 10 ml hUC- MSC intravenous infusion was carried out on the patient with a cell density of 5 x 106- 1x 107/ml. The patient was followed for 12 months post-infusion. At the end of the 12-month follow-up, his need for long-term oxygen therapy was reduced substantially,together with improvements in term of quality of life, physical performance and respiratory parameters (lung function, 6 MWD and CT fibrosis score) were all increasedfrom the base line. Throughout the entire study period, no side effects were observed. This study shows the safety and efficacy of transplanting hUC-MSCs to treat IPF and their potential in lung regeneration[50].

13) A clinical study was conducted by Zanwar et al,regarding the efficacy of human umbilical stem cells seeded on polylactic acid (PLA) and polyglycolic acid (PGA) membranes compared to that of PLA/PGA membranes alone in the treatment of multiple gingival recessions.14 cases of multiple gingival recession-with a Miller's Class I or II classification-were randomly selected and divided into the test group (treated with PLA/PGA membrane seeded with human umbilical stem cells) and the control group (treated PLA/PGA membrane alone). Mean gingival recession at the baseline and 6 months post-operation were recorded [40] .At baseline, the mean gingival recession at 16 and 14 sites in the test and control groups were measured to be at 2.28 mm and 2.14 mm respectively. At 6 months post-surgery, the test group showeda 1.57 mm mean reduction of gingival recession while the control group showed a meangingival recession of 1.24 mm; with 66% and 57% root coverage, respectively This study has therefore shown that, patients treated with PLA/PGA membranes containing the human umbilical stem cells showed a significantly higher mean root coverage compared to patients treated with PLA/PGA membranes alone[51].

14) An experimental study was conducted by the Paolo Angelini MD and Roger R.Markwald,PhD in year 2005 on stem cell treatment for heart disease in American College. There are 14 study patients and 7 control patients, all of whom had a chronic myocardial infarction. Initially, the result was by investigating pathologic anatomy, theAversa group demonstrated that the adult human myocardium maintains some degree of reproductive-cell capacity: 0.015% of the myocytes found in histologic studies of failing hearts and 0.08% of those found in infracted hearts were observed during mitosis. Stem cell transplantation significantly improved left ventricular ejection fraction (LVEF) by 4.58% (95% CI: 3.73-5.43%; p=0.00001), improved left ventricularend-systolic volume (LVESV) by -5.18 ml (95% CI: -9.74 to -0.63 ml; p=0.03),andthere was no difference in the risk of all-cause mortality0.97; 95%[52].

15) Wang L,Huang S , Li S , Li M,Shij,BaiW,Wang Q, Zheng L,Liu Y. Efficacy and safety of umbilical cord mesenchymal stem cell therapy for rheumatiod arthritis patients: A prospective phase 1/2 study.drugDesDevelther .2019

Result:1 year and 3 years after UC-MSC cells treatment, the blood routine, liver and kidney function and immunoglobulin examination showed no abnormalities, which were all in the normal range. The ESR, CRP, RF of 1 year and 3 years after treatment and anti-CCP of 3 years after treatment were detected to be lower than that ofpretreatment, which showed significant change ($P < 0.05$). Health index (HAQ) and joint function index (DAS28) decreased 1 year and 3 years after treatment than beforetreatment ($P < 0.05$)[53].

Conclusion: UC-MSC cells plus DMARDs therapy can be a safe, effective and feasibletherapeutic option for RA patients.

32.A descriptive study was conducted by Tomar Sonam,Khatoon Parveen,Malik Rehnuma, Issachar Aradhna, Rana Payal ,Ram Pradeep,Hansda Andrewon level of knowledge stem cell banking among antenatal mothers in selected hospital,Dehradun in 2022 . Sample size was 90. The study finding revealed that the majority of the antenatal mothers (64.4%) had poor knowledge, (35.5%) had average knowledge and remaining (0%) had good knowledge. The study result revealed that there was statistically significant association between the level of knowledge with their demographic variable. The purpose of the present study was to find out the knowledgeregarding the umbilical cord blood stem cell banking among antenatal mothers in selected hospital of Dehradun. Majority of the antenatal mothers had less knowledge regarding umbilical cord blood stem cell banking and there is need to improve it with the help of health education programme[54].

33.A Quasi experimental study was conducted by Catherine Edwin Francis 1 , R. Deenajothy 2 , M.Hemamalini 3 and D.C. Titus Immanuel on effectiveness of structured teaching programme on knowledge regarding stem cells and cord blood banking among antenatal mothers at Mogappair, Chennai in 2016.Sample size was 50.A knowledge questionnaire and STP was used. The results of the study revealed that there was a significant difference between pre-test and post-test knowledge on stem cell and cord blood banking among antenatal mothers at p=0.001 level[55].

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III. METHODOLOGY

Research methodology is a way to systematically solve the research problem. It may be understood as a science of studying how research is done scientifically. It includes research approach, research design, the setting, the population, sample, sampling technique, development and description of tools, procedures for data collection and plan for data analysis.

A. Research Approach

Research approach involves the description of the plan to investigate the phenomenonunder the study in a structured, unstructured or a combination of the two methods (quantitative & qualitative integrated approach).

The study was to assess the effectiveness of structured teaching programme on knowledge regarding umbilical cord stem cell therapy among health care professional students. A quantitative evaluative research approach was adopted for study in order to accomplish the objective[56].

B. Research Design

Research design is the plan for addressing research question including strategies for enhancing the studies. It is the researchers overall plan for answering the research questions or testing the hypotheses. It is known as a blue print the researcher selected to carry out research study. The research design selected for this study was Quasi- experimental one group pre-test—post-test design.

Symbolically represented as;

Pretest	Intervention	Post test
O1	X	O2

One group pre-test post-test design

O1 – pre-test: Assessment of knowledge of health care professional students regardingumbilical cord stem cell therapy.

X – Intervention: Structured teaching programme on umbilical cord stem cell therapy.

O2 – Post-test: Assessment of knowledge health care professional students regarding umbilical cord stem cell therapy

C. Variables

Variable are attributes or characteristic that can have more than one value or they are qualities, properties or characteristics of people, things or situations that change or vary.The variable in the study includes dependent, independent and extraneous variable[57].

D. Independent Variable

The variable that is believed to cause or influence the dependent variable. In this study independent variable is the structured teaching program regarding umbilical cord stemcell therapy[58].

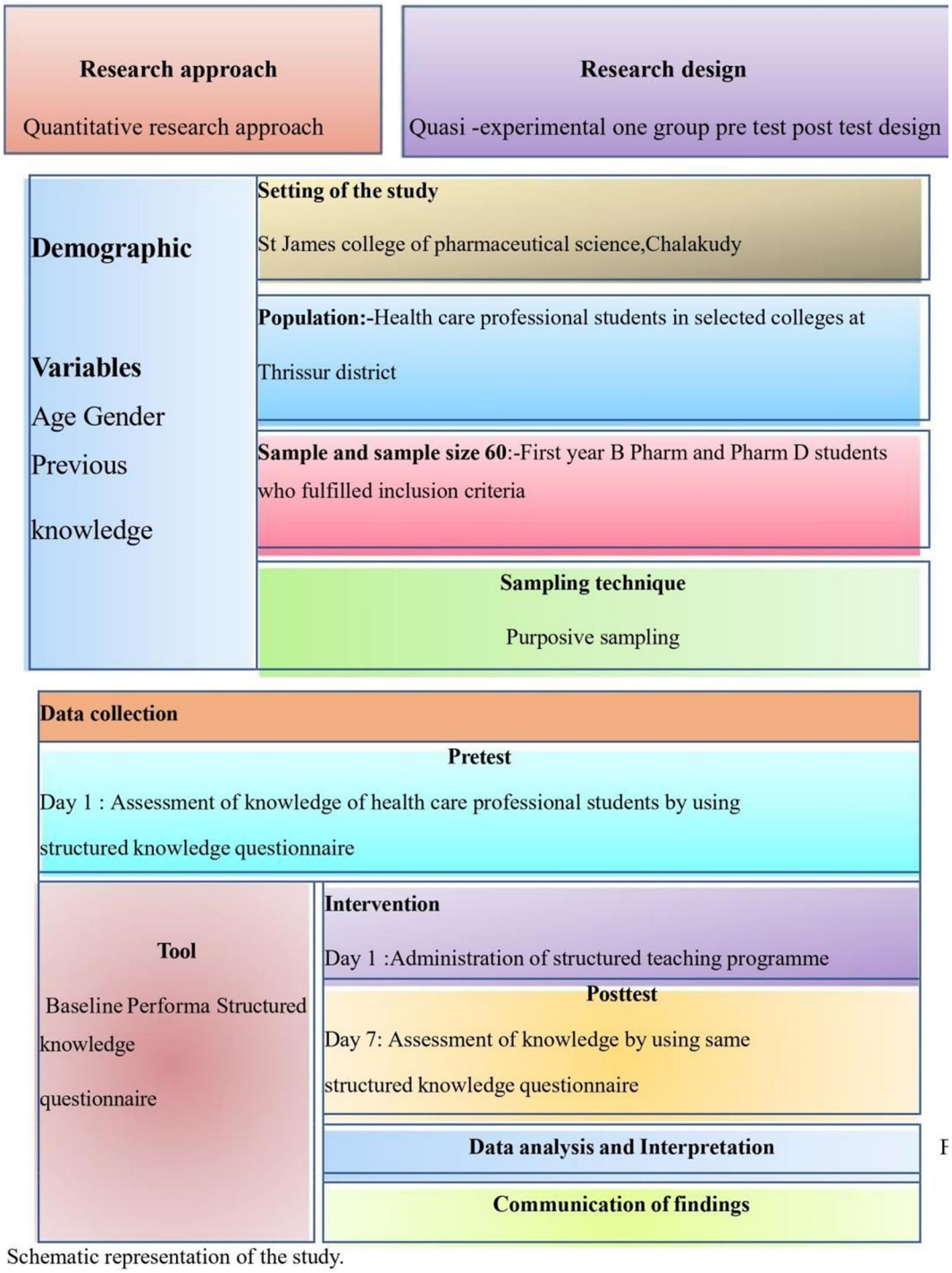
E. Dependent Variable

The variable hypothesized to dependent on or be caused by another variable. In this study the dependent variable is knowledge of health care professional students regarding umbilical cord stem cell therapy[59].

F. Extraneous Variable

A variable that confounds the relationship between independent and dependent variables and that needs to be controlled either statistically or in the research design. Inthis study extraneous variables are age, gender & previous knowledge on umbilical cordstem cell therapy[60]

RESEARCH DESIGN



Schematic representation of the study.

G. Setting Of The Study

"Setting is the physical location and condition in which data collection take place in a study"[61]. According to researcher's convenience the setting of the study was St James college of pharmaceutical science, Chalakudy.

H. Population

"Population refers to the entire set of individual or objects have some commoncharacteristics also the entire aggregation of cases in which the researcher has interest".In this study population composed of health care professional students[62].

I. Sample

A sample is a subset or some part of a larger population selected to participate in the research study[63]. In this study the samples were health care professional students of StJames college of pharmaceutical science, Chalakudy.

J. Sampling Technique

Sampling is the selection of part of an aggregate or totality on the basis of with a judgement or inference about the aggregate or totality is made. In this study Non- probability purposive sampling is used in obtaining required size of sampling. The researchers purposively selected health care professional students of St James college of pharmaceutical science[64].

K. Criteria for sample collection:

The researcher set criteria for selecting the sample data which will enable him to estimate population[65].

Inclusion criteria

The criteria that specify population characteristics are referred to aseligibility criteria.

- Health care professional students available during the period of data collection.
- Health care professional students between the age group of 18-24years
- Both male and female.

Exclusion criteria

The criteria that specify the population in terms of characteristicsthat people must not possess is called exclusion criteria[66].

- Students who are not willing to participate in the study.
- Health care professional students who have sensory disability

L. Tool

In this study, the researcher developed tool from the careful review of literature and discussion with experts and based on experience of the investigator. The present study was to assess the effect of structured teaching program on knowledge regarding umbilical cord stem cell therapy among health care professional students. Data was collected using the following tool[67].

Tool: structured questionnairePart 1: Baseline proforma

Part 2: structured knowledge questionnaire Technique: Self structured questionnaire

Development/ selection of tool

The tool developed for the study was knowledge questionnaire to assess the knowledge of health care professional students regarding umbilical cord stem cell therapy.

The following steps were adopted in the development of tool:

1) Review of literature from the books, journals and other publications.
2) Discussion with experts including the guide, gynecologists andinvestigators observation and intuition.
3) Review of the tools developed by others.
4) Development of blue print
5) Construction of a base line proforma
6) Construction of a structured knowledge questionnaire
7) Content validity
8) Reliability by split-half method

Description of the tool

The tools are prepared on the basis of objectives of the study[68].

Structured knowledge questionnaire regarding umbilical cord stem cell therapy.

Part 1: Baseline proforma

It consists of the items for obtaining information regarding umbilical cord stemcell therapy.

Part 2: structured knowledge questionnaire

It consists of 20 structured knowledge questions.

The knowledge questionnaire was developed to determine the knowledge of health care professional students regarding umbilical cord stem cell therapy. Theitems of the questionnaire were developed as per the blue print and the areas included were:

- Stem cell
- Stem cell therapy
- Cord blood banking
- Donor criteria

The items were multiple choice type questions with one correct response andeach carry equal score. The questionnaire was prepared in English. To interpret the level of knowledge, the scores were distributed as follows;

Grading	Score
Poor	0-5
Average	6-10
Good	11-15
Excellent	16-20

knowledge of health care professional students of selected college regarding umbilical cord stem cell therapy. After reviewing literature seeking opinion of the expert and from personnel experience, the structured teaching program was developed to teach regarding umbilical cord stem cell therapy. Power point was used for the teaching program. The steps involved in the development of structured teaching program are:

M. Development of the criteria checklist

A criterion check list was prepared by the investigator for assessing whether there is agreement or disagreement with the formulation of objectives, selection of content, and organization of content, language, feasibility and acceptability.

N. Preparation of first draft of structured teaching programme

The first draft was developed after reviewing the available literature and consulting with experts.

O. Content validity of structured teaching programme and AV aids

The STP and AV aids were given to 5 experts to establish content validity and they were requested to give their opinion and suggestions about the content of STP. They were given the criteria checklist and asked to place a tick mark against agree or disagree. Suggestions were considered and modifications done with their suggestions were incorporated in to the final draft. There was 100% agreement by the experts on the content of STP. One expert suggested reorganizes the areas according to the priority. This suggestion was in cooperated in the final draft of the STP.

P. Preparation of final draft of structured teaching programme

The final draft was prepared after modification based on the content validity andthe suggestions given by experts. The STP developed was based on general and specific objectives.

Q. Preparation of the blue Print

Blue print was prepared prior to the construction of structured knowledge questionnaire. It depicted the distribution of items according to thecontent areas in three domains.

CATEGORY	SCORE	PERCENTAGE(%)
Knowledge	8	40
Application	7	35
Understanding	5	25

R. Content Validity

Content validity refers to the degree to which an instrument measures what itis supposed to measure.

To determine the content validity of the data collection tool were submitted to 5 nursing experts along with objectives of the study, blue print of the tool and criteria check list. They were asked to give their opinions and suggestions about the content of the tool. The suggestions in tool were considered and modifications were done[69].

S. Reliability Of The Tool

Reliability is the degree of consistency and accuracy with which an instrument measures the attribute for which it is designed to measure. It is then concerned with the consistency, accuracy, precision, stability, equivalence and homogeneity.

The reliability of tool was established by using the data collected from health care professional students. Split half method was used to measure the internal consistency of the structured knowledge questionnaire. The reliability of the tool was found using Karl Pearson's product moment correlation formula and was found to be 1 for structured knowledge questionnaire, which indicated that the tool was reliable[70].

T. Pilot Study

A pilot study is a miniature version of the planned research, researcher to identifyand correct problems which could affect the research process. The pilot study was conducted in St. James College of Nursing, Chalakudy from 13-11-23 to 18- 11-23 after obtaining permission from the principal. To find the feasibility of the study 6 health care professional students were selected by using purposive sampling method and according to the inclusion and exclusion criteria.

The researcher introduced herself to the health care professional students. The purpose of the study was explained. Informed consent was taken from the participants. On 13 November 2023 pre-test was conducted for 6 subjects by using structured knowledge questionnaire. On the same day structured teaching program with necessary instructions were administered. On 18 November 2023 post test was conducted for 6 subjects using same structured knowledge questionnaire.

Data was analyzed by descriptive and inferential statistics. The study was found tobe feasible and practicable. There was no necessity for the changes in the designof the final study. The investigator then proceeded for the main study.

U. Data Collection Process

A data collection is the precise, systematic gathering of information relevant to the research purpose or specific objectives, questions or hypothesis of a study. Data collection was done in St. James College of pharmaceutical sciences Chalakudy. Formal permission was obtained from the concerned authority of the college. Data collection period was from 20-11-2023 to 25/11/2023. The subjects were identified according to the inclusion and exclusion criteria and by purposive sampling technique. The sample size was 60 health care professional students.

An informed consent was obtained from the health care professional students after explaining the purpose of the study and the confidentiality was assured to the subjects. On the first day pre-test was conducted using structured knowledge questionnaire and following structured teaching program was administered. From the 5th day to 7th day post-test was conducted for the same healthcare professional students by using the same structured knowledge questionnaire to determine the effectiveness of structured teaching program. The data collected was compiled for analysis[71].

V. Plan For Data Analysis

Analysis is the process of organizing and synthesizing the data so as to answer research questions and test hypothesis. For the present study the data obtained is planned to be analyzed on the basis of the objectives of the study using descriptive and inferential statistics. To compute the data a master sheet was prepared by the investigator. The knowledge of subjects before and after administration of STP would be calculating using range frequency, mean and standard deviation.

Organize the data in master sheet by the investigator

- Baseline proforma containing the sample characteristics would beanalyzed using frequency and percentage
- The significant difference between pre-test and post-test knowledge will bechecked by using paired t-test
- Association between pre-test knowledge will be checked by using chi-square test.

After the data collection, data were planned to organize, tabulate and summarizeby preparing master data sheet[72].

W. Summary

The research methodology is the blue print or overall plan for the entire process of tackling the research problem in a systematic and scientific manner. The chapter dealt with research approach research design, sample and sampling technique, research setting, development of tool, content validity, reliability, pilot study, data collection process and plan for analysis[73].

IV. DATA ANALYSIS AND INTERPRETATION

Analysis is the process of organizing and synthesizing the data so as to ensure researchquestions and test hypothesis. It is also defined as the process of systematically applyingstatistical and logical techniques to describe, summarize and compare data[74]

Analysis of quantitative data deals with information collected during the research study which can be quantified and statistical calculations can be compute. Data analysis includes various steps. It includes data preparation, description of data, drawing inferences of data and interpretation of data.

The study was conducted among the first year Pharm D and B Pharm students of St James college of pharmaceutical science, Thrissur. The collected data was organized, tabulated, analyzed and interpreted using descriptive and inferential statistics. The analysis of data was done based on objectives and hypothesis.

A. Objectives

To assess the pre and posttest knowledge on stem cell thera py among health care professional students.

•To evaluate the effectiveness of the structured teaching program on knowledgeregarding umbilical cord stem cell therapy.

•To find association between pretest knowledge score regarding umbilical cord stem cell therapy with their selected demographic variables

B. Hypothesis

- H1 – There is significant difference in pretest and posttest knowledge scoresregarding umbilical cord stem cell therapy among health care professional students.
- H2- There is significant association between pretest knowledge scores with theselected demographic variables .

C. Organization Of Findings

The data collected were edited, tabulated, analyzed, interpreted and findings obtained were presented in the form of tables and diagrams under the following sections

Section 1: Description of demographic variables.

Section 2: To assess the pre-test knowledge regarding umbilical cord stem cell therapyamong health care professional students.

Section 3: paired t test to assess the effectiveness of structured teaching programme on knowledge score among health care professional students.

Section 4: Association between pre-test knowledge scores regarding umbilical cord stem cell therapy with selected demographic variables of health care professional students

1) Section 1: Description Of Demographic Variables

Table1: Frequency And Percentage Distribution Of HealthCare Professional Students According To Selected Demographic Variables

(N=60)

VARIABLE	FREQUENCY (f)	PERCENTAGE (%)

1.Age in years		
a) Below 18 years	2	3.33
b)18 to 21 years	57	95
c)22-24 years	1	1.67
d)Above 25 years	0	0
2.Gender		
a) Male	9	15
b) Female	51	85
c)Transgender	0	0
d)Others	0	0
3.Previous knowledge		
a) Yes	7	11.67
b) No	53	88.33

Age

The pie diagram shows that 95% of health care professional students were the agegroup of 18 – 21 years,3.33% were belongs to age group of below 18 years and remaining 1.67% were belongs to age group of 22-24 years.

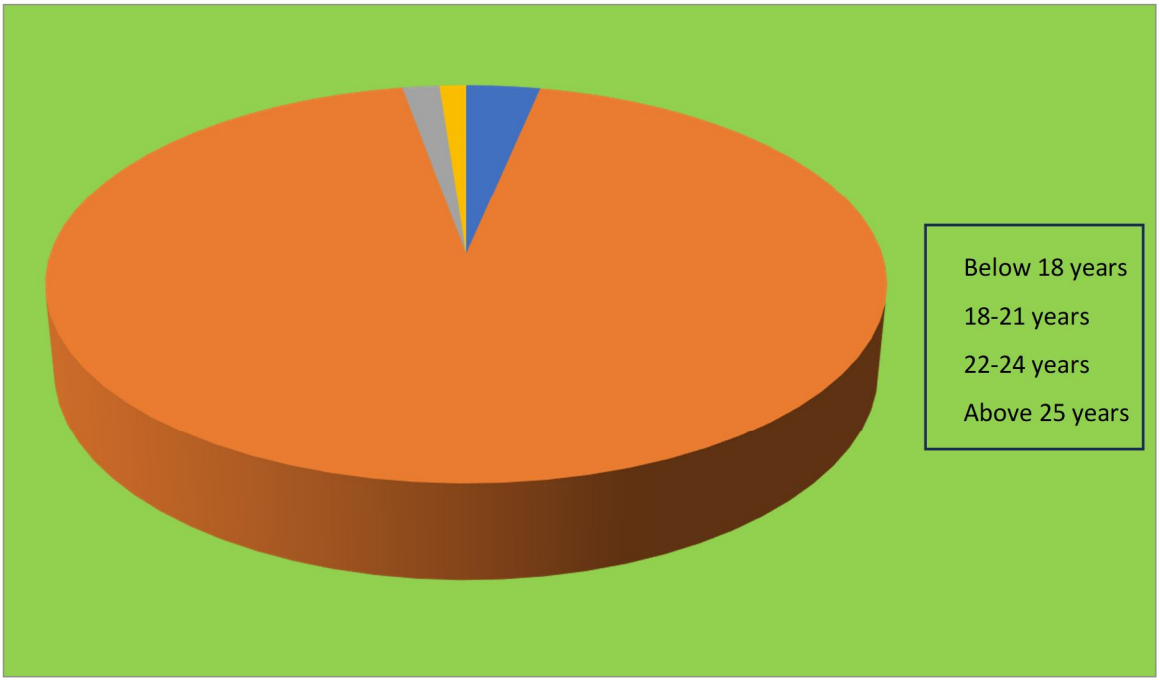


Figure 2:Frequency and percentage distribution of health care professionalstudents according to their age

Gender

The data revealed that 85% of health care professional students were females andremaining 15% were males.

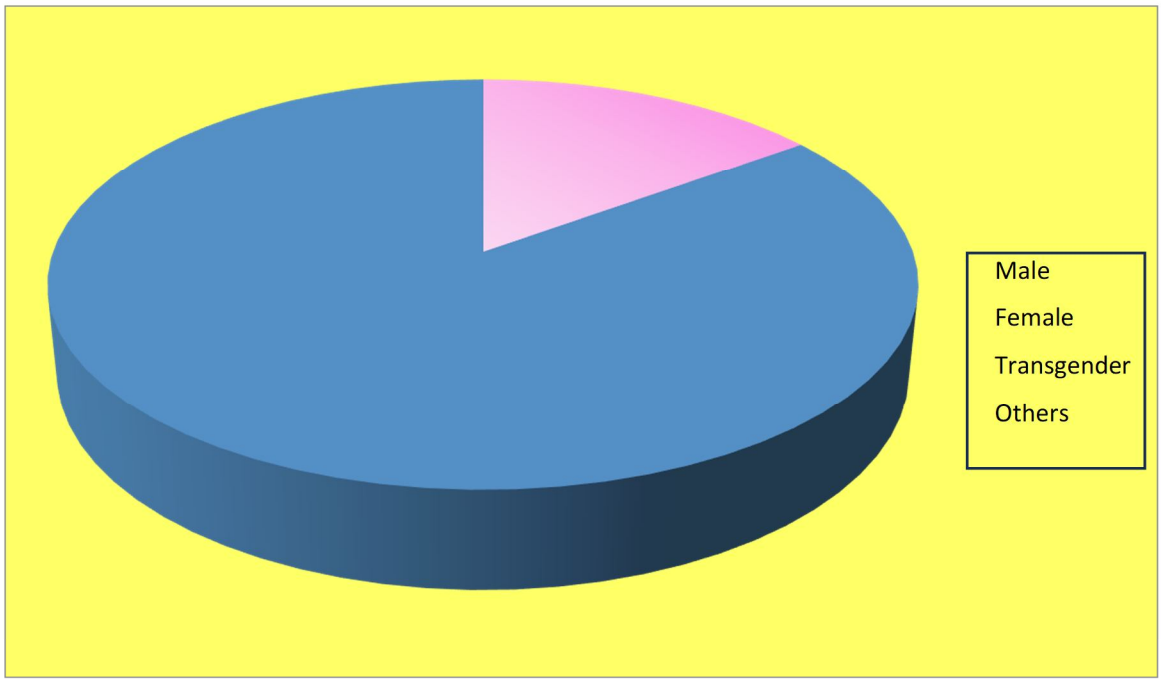


Figure 3: Frequency and percentage distribution of health care professionalstudents according to gender.

Previous Knowledge

The data revealed that 88.33% of health care professional students had no previous knowledge and 11.67% of health care professional students had previous knowledge.

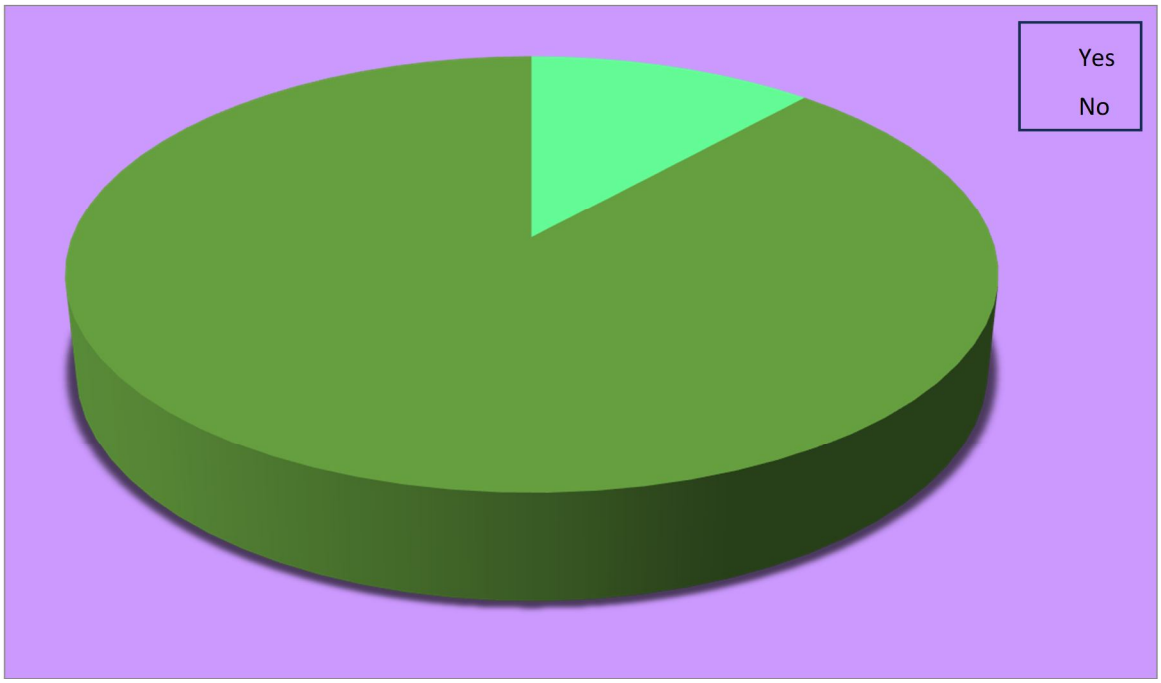


Figure 4: Frequency and percentage distribution of health care professionalstudents according to their previous knowledge.

Section 2: to assess the pretest knowledge regarding umbilical cord stem cell therapy among health care professional students.
Pre-test knowledge of health care professional students regarding umbilical cord stem cell therapy was assessed by using structured knowledge questionnaire and analyzed using descriptive statistics as presented in the table.

Table 2 : Mean and mean percentage of knowledge regarding umbilical cord stemcell therapy among the samples.
(N=60)

Maximum possible knowledge score	Pre-test mean	Percentage (%)
20	7.26	36.3

Table 2: Showed that the mean pre test knowledge score is 7.26 and meanpercentage is 36.3%.

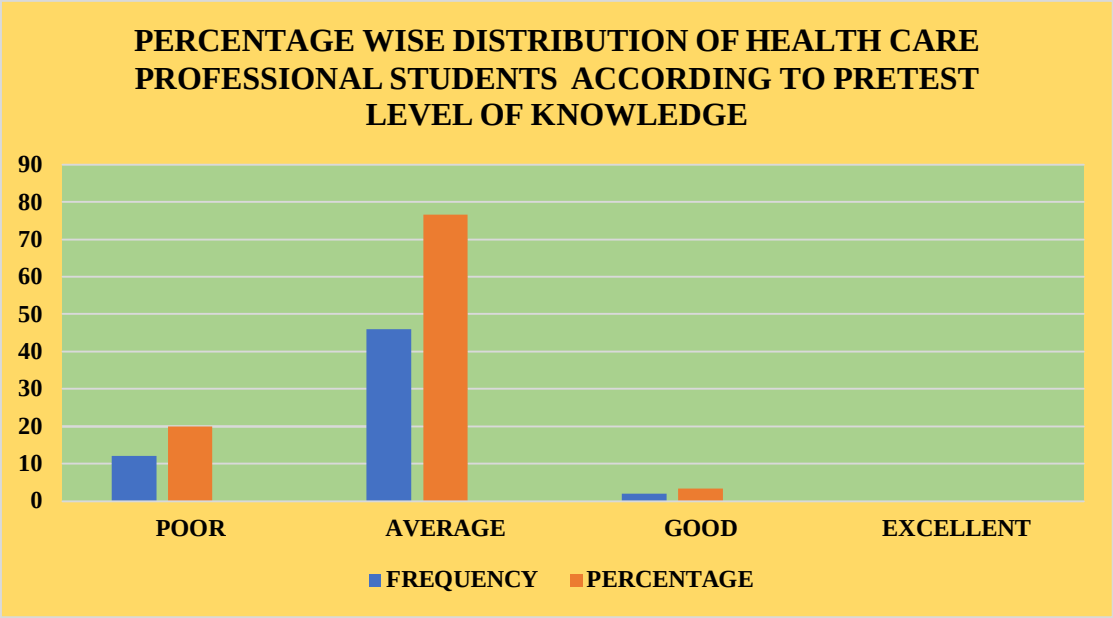


Figure 5: Percentage wise distribution of health care professional studentsaccording to pretest level of knowledge

2) *Section 3: To Assess The Effectiveness Of Structured Teaching Programme With Paired 'T' Test.*
This section describes the effectiveness of structured teaching program on level of knowledge regarding umbilical cord stem cell therapy using 'test. In order to find the effectiveness of structured teaching program bon umbilical cord stem cell therapy knowledge score,the research hypothesis was formulated.
H1 – There is significant difference in pretest and posttest knowledge scores regarding umbilical cord stem cell therapy among health care professional students.

Table 3: standard deviation, mean difference and paired 't' value of knowledge regarding umbilical cord stem cell therapy among the samples.
(N= 60)

Knowledge score	Mean	SD	Mean difference	Paired't' value	Df	Tabled value
Pre-test	7.26	2.07				
			3.3	8.98	59	2.00
Post-test	10.6	2.67				

Significant at 0.05 level

Table 3: showed that the mean of post test knowledge score 10.6 was significantlyhigher than their mean pre test knowledge score 7.26 with mean difference of 3.3.The calculated paired 't' test value (8.98) is greater than tabled value(2.00) at 0.05 level of significance.

3) Section 4: association between pre test knowledge score regarding umbilical cord stem cel therapy with selected demographic variables of health care professional students.

This section describes the association between pretest knowledge score and selected demographic variables . In order to find the association between pretest knowledge score and selected demographic variable the null hypothesis was formulated**.**

HO2 : There is no significant association between pretest knowledge score of healthcare professional students.

Table 4: Association of knowledge score of health care professional students withage in years.
(n=60)

Age in years	Pretest level of knowledge					Chi square	df	P value
	Poor	Average	Good	Excellent	Total			
Below 18 years	0	2	0	0	2	.961	4	9.49
18 – 21 years	12	43	2	0	57			
22-24 years	0	1	0	0	1			
Above 25 years	0	0	0	0	0			
Total	12	46	2	0	60			

Significant at 0.05 level. NS= not significant.

Table 4 shows that chi square value (0.961) computed between post test knowledge and age in year was not significant at 0.05 level of significance.Hence,the null hypothesis is accepted.

TABLE 5: Association Of Pre-Test Knowledge Scores Of First Year B Pharm And Pharm D Students With Their Previous Knowledge Regarding Umbilical Cord Stem CellTherapy.

Previous knowledge	Pretest level of knowledge					Chi square	df	P value
	Poor	Average	Good	Excellent	Total			
Yes	1	5	1	0	7	3.009	2	5.99
No	11	41	1	0	53			
Total	12	46	2	0	60			

Table5: shows that chi square value(3.009) computed between pret test knowledgescore and previous knowledge was not significant at 0.05 level of significance. Hence,the null hypothesis is accepted .

D- Discussion

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Summary

This chapter had dealt with statistical analysis and interpretation of the data. Differential statistical methods were used to attain the objectives of the study. The selected demographic variables were dealt with frequency and percentage. The descriptive statistics were used to find out the mean, median,range,standard deviation and t valueof the knowledge scores of first year Pharm D and B Pharm students. Chi square was computed to find out the association between the level of knowledge and their selecteddemographic variables[75].

V. RESULT

The term result refers to the answers to research questions obtained through an analysis of the collected data. The purpose of the chapter was to compare association of knowledge of health care professional students and their selected demographic variables.

A. Objectives

The main objective of the study is :-

1) To assess the pre and post test knowledge on stem cell therapy among health careprofessional students.
2) To evaluate the effectiveness of the structured teaching program on knowledge regarding umbilical cord stem cell therapy healthcare professional students.
3) To find association between pretest knowledge score regarding umbilical cord stem cell therapy with their selected demographic variables .

B. Hypothesis

1) H1 – There is significant difference in pre test and post test knowledge scoresregarding umbilical cord stem cell therapy among health care professional students.
2) H2- There is significant association between pretest knowledge scores with theselected demographic variables .

C. Results

The result was organized under different sections:

Section I: Findings related to demographic variables of subjects

Section II: Findings related to description of knowledge of subjects.

Section III: Findings related to association of level of knowledge of subjects andtheir selected demographic variables .

1) Section I: Findings related to demographic variables of subjects

a) Age in years: Majority of health care professional students (95%) were in the agegroup of 18 -21 years.
b) Gender: Majority of healthy care professional students (85%) were females.
c) Previous knowledge regarding umbilical cord stem cell therapy: Majority of healthcare students (88.33%) has poor knowledge regarding umbilical cord stem cell therapy

Section II: Findings related to description of knowledge of subjects.

76.66% had average knowledge,20% of health care professional students had poorknowledge and 3.33% of health care professional students had good knowledge.

Section III: Findings related to association of level of knowledge of subjects andtheir selected demographic variables .

The calculatedchi square value of demographic variables such asage(0.961), gender(3.33), previous knowledge (3.009) is significant under the table value 0.5. so, there is significant association between level of knowledge regarding umbilicalcord stem cell therapy, hence the hypothesis H1 is accepted.

D. Summary

This chapter deals with the major findings of the study which showed that majority of health care professional students were had average knowledge regarding umbilical cordstem cell therapy . hence it is necessary to improve the knowledge regarding umbilical cord stem cell therapy in health care professional students to increase in awarenesss onumbilical cord stem cell therapy.The study recommends the need to conduct health education regarding umbilical cord stem cell therapy. Hence the hypothesis H1 is accepted[76].

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VI. DISCUSSION, SUMMARY AND CONCLUSION

The study is to evaluate the effect of structured teaching programme on knowledge regarding umbilical cord stem cell therapy among health care professional students. Conclusion, Nursing implications, Limitations and Recommendations of the study arealso included in this chapter.

A. Discussion

Discussion refers to whether the research finding or study report defers from previous literature. The study was intended to evaluate the effect of structured teaching programme on knowledge regarding umbilical cord stem cell therapy among health care professional students[77].

The discussion was done under the following headings:

Section 1: Description of demographic variables.

Section 2: To assess the pretest knowledge regarding umbilical cord stem cell therapy among health care professional students.

Section 3: To assess the effectiveness of structured teaching programme with paired t test.

Section 4: Association between pre-test knowledge scores regarding umbilical cord stem cell therapy with selected demographic variables of health care professional students.

Section 1: description of demographic variables.

- Age in years: The data showed that 65% of health care professional students were the age group of 21-23 years, 24% were belongs to age group of 24-26 years and remaining 11% were belongs to age group of above 26 years.
- Gender: The data revealed that98% of health care professional students were femalesand remaining 2% were males.
- Previous knowledge: The data revealed that 61% of health care professional studentshad previous knowledge and 39% of health care professional students had no previousknowledge.

Section 2: to assess the pretest knowledge regarding umbilical cord stem cell therapy among health care professional students.

The mean pretest knowledge score is 13.78 and mean percentage is 45.93%. The data shows that out of 60 samples 73.91% score average marks and 26.09% score poor marks in the pretest.

Section 3: to assess the effectiveness score of structuredteaching programme with paired t test.

The mean of post test knowledge score 19.46 was significantly higher than their meanpre test knowledge score 13.78 with mean difference of 5.68. The calculated paired't' value (5.86) is greater than tabled value (tas-2.00) at 0.05 level of significance. The mean post test knowledge score of health care professional students after the administration of structured teaching programme on umbilical cord stem cell therapy issignificantly higher than the mean pre test knowledge score. Hence the null hypothesis(Ho) is rejected and the research hypothesis is accepted. This is showed that there is significant improvement in the knowledge score of health care professional students after the structured teaching programme.

Section 4: association between pre-test knowledge scores regarding umbilical cord stem cell therapy with selected demographic variables of health care professional students.

Result revealed that there was no significant association between the health care professional students knowledge and their selected demographic variables of health care professional students age and previous knowledge.

B. Summary

This chapter gives the summary of the salient features, limitations, implications and recommendations for nursing practice, nursing education, nursing administration and nursing research.

1) Statement Of The Problem

“A study to assess the effectiveness of structured teaching program on knowledge regarding umbilical cord stem cell therapy among health care professional students in selected colleges at Thrissur district.”

2) Objectives

- To assess the pre and post test knowledge on stem cell therapy among health careprofessional students.
- To evaluate the effectiveness of the structured teaching program on knowledgeregarding umbilical cord stem cell therapy.

- To find association between posttest knowledge score regarding umbilical cord stemcell therapy with their selected demographic variables.

3) Assumptions

Students have basic knowledge regarding stem cell therapy.
Structured teaching programme is a method to impart knowledge to the students.

4) Hypothesis

- H1 – There is significant difference in pre test and post test knowledge scoresregarding umbilical cord stem cell therapy among health care professional students.
- H2- There is significant association between pre test knowledge scores with theselected demographic variables.

5) Methodology

"An evaluative research approach was used for the study using non-probability purposive sampling, a total of 60 samples were collected"[78],
Proforma for selected demographic variables and structured knowledge questionnaire were prepared by the researchers for the data collection.
The tool was validated by experts from the field of nursing and tools were found to bevalid for the study.
The final study was conducted from20 /11/2023-25/11/2023; questionnaire method was used to collect the data regarding demographic variables and knowledge of health careprofessional students. The collected data was coded, tabulated and interpreted according to the objectives of the study. Descriptive and inferential statistics was usedfor that the analysis.

6) Salient Features Of The Study Findings

Findings related to the selected demographic variables of health care professionalstudents

- Majority of health care professional students (65.2%) were the age group of 21-23years.
- Study result shows that majority of health care professional students (97.8%) werefemales.
- Study result shows that majority of health care professional students (60.9%) hadprevious knowledge regarding umbilical cord stem cell therapy.

Findings related to the knowledge of health care professional students:
Significant improvement in the knowledge score of health care professional students after the structured teaching programme and also no significant association between thehealth care professional students knowledge and the selected demographic variables and previous knowledge regarding umbilical cord stem cell therapy.

7) Implications

The findings of the present study have implications for nursing practice, mining education, nursing administration and nursing research.

- Nursing practice: Each nurse has responsibility to improve the knowledge regarding umbilical cord stemcell therapy.
- Nursing education: The present study suggests that there is increased need for teaching programme among health care professional students regarding the umbilical cord stem cell therapy. Each of the rising blossoms should be motivated for improving the knowledge regarding theumbilical cord stem cell therapy[79].
- Nursing Administration: Teaching program is an essential process, it enables the learner to update their knowledge the findings of the above study helps to plan, implement educational strategies for health care professional students to improve their knowledge[80].
- Nursing Research: The research should be conducted to find out the knowledge regarding umbilical cord stem cell therapy and use this knowledge in clinical settings[81].

8) Limitations

The study setting was limited to 60 samples only. Hence possibility for wider generalization is limited.
The study was limited in 60 health care professional students of St James College of Pharmaceutical Science.

9) Recommendations

- A similar study may be replicated on a large sample for better generalization ofresult.
- An observational study may be conducted to find out effectiveness of structuredteaching programme.

C. Conclusion

The present study aimed to assess the knowledge of health care professional students regarding umbilical cord stem cell therapy. Data was collected from health careprofessional students.

Collected data was analysed by using descriptive and inferential statistics and presentedin the form of tables and graphs. The effective structured teaching programme was determined by paired t test. Chi-square was computed to find out the association between level of knowledge of health care professional students and their selected demographic variables.

The findings of the study revealed that there is a significant improvement in the knowledge score of health care professional students after the structured teaching programme. The levels of knowledge of health care professional students had no significant association with their selected demographic variables.

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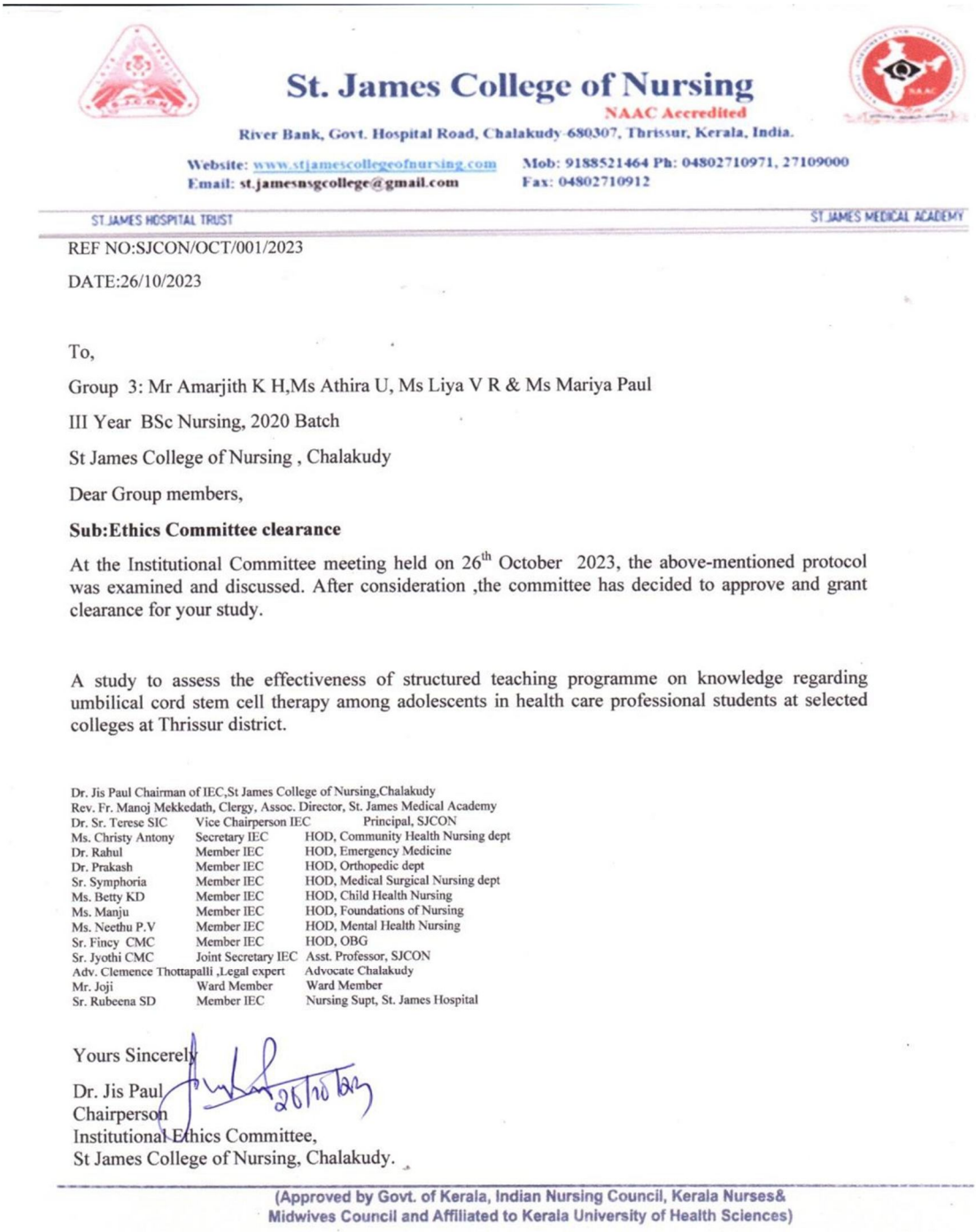
ANNEXURE

Annexure a

Ethical committee clearance certificate



St. James College of Nursing

NAAC Accredited

River Bank, Govt. Hospital Road, Chalakudy-680307, Thrissur, Kerala, India.

Website: www.stjamescollegeofnursing.com Mob: 9188521464 Ph: 04802710971, 27109000
Email: st.jamesnsgcollege@gmail.com Fax: 04802710912

ST JAMES HOSPITAL TRUST ST JAMES MEDICAL ACADEMY

REF NO:SJCON/OCT/001/2023

DATE:26/10/2023

To,

Group 3: Mr Amarjith K H,Ms Athira U, Ms Liya V R & Ms Mariya Paul

III Year BSc Nursing, 2020 Batch

St James College of Nursing , Chalakudy

Dear Group members,

Sub:Ethics Committee clearance

At the Institutional Committee meeting held on 26th October 2023, the above-mentioned protocol was examined and discussed. After consideration ,the committee has decided to approve and grant clearance for your study.

A study to assess the effectiveness of structured teaching programme on knowledge regarding umbilical cord stem cell therapy among adolescents in health care professional students at selected colleges at Thrissur district.

Dr. Jis Paul Chairman of IEC,St James College of Nursing,Chalakudy		
Rev. Fr. Manoj Mekkedath, Clergy, Assoc. Director, St. James Medical Academy		
Dr. Sr. Terese SIC	Vice Chairperson IEC	Principal, SJCON
Ms. Christy Antony	Secretary IEC	HOD, Community Health Nursing dept
Dr. Rahul	Member IEC	HOD, Emergency Medicine
Dr. Prakash	Member IEC	HOD, Orthopedic dept
Sr. Symphoria	Member IEC	HOD, Medical Surgical Nursing dept
Ms. Betty KD	Member IEC	HOD, Child Health Nursing
Ms. Manju	Member IEC	HOD, Foundations of Nursing
Ms. Neethu P.V	Member IEC	HOD, Mental Health Nursing
Sr. Fincy CMC	Member IEC	HOD, OBG
Sr. Jyothi CMC	Joint Secretary IEC	Asst. Professor, SJCON
Adv. Clemence Thottapalli ,Legal expert		Advocate Chalakudy
Mr. Joji	Ward Member	Ward Member
Sr. Rubeena SD	Member IEC	Nursing Supt, St. James Hospital

Yours Sincerely

Dr. Jis Paul
Chairperson
Institutional Ethics Committee,
St James College of Nursing, Chalakudy.

(Approved by Govt. of Kerala, Indian Nursing Council, Kerala Nurses& Midwives Council and Affiliated to Kerala University of Health Sciences)

Annexure B
Letter Granting Permission To Conduct MainStudy

MOB : 9188521464
Phone : 04802710971,2710900
Fax : 0480 2710912

St. James' College of Nursing

River Bank, Govt. Hospital Road, Chalakudy- 680 307, Thrissur, Kerala, India.
Website : www.stjamescollegeofnursing.com E-mail : st. jamesnsgcollege@gmail.com

ST. JAMES' HOSPITAL TRUST ST. JAMES' MEDICAL ACADEMY

No. SJCON/Research/2023 Date: 20-11-2023

To
The Principal
St. James College of Pharmaceutical Sciences
Chalakudy

Respected Sir,

Subject: Request for permission to conduct the research study-

Our third year B.Sc Nursing students need to undertake a research study to complete their requirement as a part of their curriculum under the guidance of Ms.Dency C.D. I am writing this letter to seek your permission to conduct the research study on 20-11-2023 at 10.15 am to 11.15am at St. James College of Pharmaceutical Sciences, Chalakudy. The study details are given below.

" A study to assess the effectiveness of structured teaching programme on knowledge regarding umbilical code stem cell therapy among health care professional students in selected colleges at Thrissur District."

Name of the students

- Amarjith K.H
- Athira U
- Liya V.R
- Mariya Paul

Kindly grant necessary permission.

Yours faithfully,

Principal
Dr. Sr. TERESE SIC
PRINCIPAL
ST.JAMES'COLLEGE OF NURSING
RIVER BANK, CHALAKUDY-680307

ST.JAMES' COLLEGE OF NURSING RIVER BANK CHALAKUDY PIN: 680307

St. James' College of Pharmaceutical Sciences
(Accredited by NAAC)
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E-mail : stjamespharmacycollegecky@gmail.com
www.stjamespharmacycollege.in
St. James' Hospital Trust | St. James' Medical Academy

Ref. No: SJCOPS/Research/2023 Date: 14.11.23

To
The Principal
St. James College of Nursing
Chalakudy

Respected Sir/Madam

Subject: Approval to conduct research study

With reference to your letter (SJCON/Research/2023, Dated: 20.11.23), I am giving permission to third year B.Sc Nursing students of St. James College of Nursing, to conduct the research study on " ***A study to asses the effectiveness of structural teaching programme on knowledge regarding umbilical code stem cell therapy among health care professional students in selected colleges in Thrissur District***" at our college on 20.11.23 at 10.15AM to 11.15AM.

Name of the third year B.Sc Nursing students
Amarjith K.H
Athira U
Liya V.R
Mariya Paul

ST. JAMES COLLEGE OF PHARMACEUTICAL SCIENCES RIVER BANK CHALAKUDY 680 307

Yours
Faithfully,
14/11/23.
Dr.K. KRISHNAKUMAR M.Pharm., Ph.D
Principal
St. James College of Pharmaceutical Sciences
St. James Medical Academy, GH Road
River Bank, Chalakudy - 680 307

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Annexure c

Letter seeking expert's opinion and suggestionfor the content validity of the tool

From,

Third year BSc. Nursing studentsSt James College of Nursing Chalakudy, Thrissur, Kerala

To,

……..

……..

Subject: Request for opinion and suggestions of Experts for Establishing ContentValidity of the Research Tool.

Respected Madam,

We third year BSc Nursing students of St James College of Nursing have selected the following topic for our research study as the partial fulfillment of requirement of BSc Nursing.

Topic: **"A study to assess the effectiveness of structured teaching program on knowledge regarding umbilical cord stem cell therapy among health care professional students in selected colleges at Thrissur district".**

We request you to go through the items and give your valuable suggestions and opinionsto develop the content validity of the tool. Kindly suggest modifications, additions anddeletions,
If any, in the remark column.

Thanking you

Date:
Place:

Yours faithfully
Third group
Third year BSc Nursing

ANNEXURE D

LIST OF EXPERTS

1. Ms.Sili C.ThomasLecturer
   St James College of Nursing Chalakudy, Thrissur
2. Ms Rinkamol ChackochanAsst.Professor
   St James College of Nursing Chalakudy, Thrissur
3. Ms Indhu RockeyAsst.professor
   St James College of Nursing Chalakudy, Thrissur
4. Ms Manju JohnAsst.professor
   St James College of Nursing Chalakudy, Thrissur
5. Sr.Fincy JosephAsst.professor
   St James College of Nursing Chalakudy, Thrissur

ANNEXURE E

CERTIFICATE FOR CONTENT VALIDATION

I hereby certify that I have validated the tool of group 3 third year BSc Nursing students,St James College of Nursing, Chalakudy who are undertaking the following study titled

"A study to assess the effectiveness of structured teaching program on knowledgeregarding umbilical cord stem cell therapy among health care professional students in selected colleges at Thrissur district".

Date: Name:
Place: Signature:
Designation:

Annexure F

Informed Consent To Participants

Informed consent form to participate in a research studyStudy title: ....
Study Number: .....

Subject's initials:.....Subject's Name: .....

Date of birth / Age: .....

(Subject)

I confirm that I have read and understood the information sheet dated ---------- for the above study and have had the opportunity to ask questions. [ ]

I understand that my participation in the study is voluntary and that I am free to withdraw at any time, without giving any reason, without my medical care or legal rightbeing affected. [ ]

I understand that the sponsor of the clinical trial, others working on the sponsor's behalf the Ethics Committee and the regulatory authorities will not need my permission to look at my health records both in respect of the current study and my further research that may be conducted in relation to it, even if I withdraw from the trial. [ ]

I agree not to restrict the use of any data or results that arise from this study provided such use is only for scientific purpose(S).

I agree to take part in the above study. [ ]

I am aware of the Audio-Visual recording of the informed Consent. [ ](Click here for Audio-Visual guidelines)
Signature (or thumb impression) of the subject /legally acceptable:Date:__/_____/ _____
Signature of the Investigator:Date:___/_____/_____
Study Investigator's Name

ANNEXURE G

ACCEPTANCE FORM FOR TOOL VALIDATION

Name:

Designation:

Name of college:

Statement of acceptance or non-acceptance to validate the tool.I give my acceptance or non-acceptance to validate the tool.

Topic: "A study to assess the effectiveness of structured teaching program on knowledge regarding umbilical cord stem cell therapy among health care professional students in selected colleges at Thrissur district".

PlaceDate:

Signature of the expert:

CRITERIA CHECKLIST FOR TOOL VALIDATION

Instructions:

Kindly go through the items in baseline data, questionnaire and check list to provideyour valuable suggestions regarding accuracy, relevance and appropriateness of the content. There are two columns in the checklist, namely agree and disagree. Place a tick mark against the specific column. If any remarks, suggestions or comments; please mention in the remark column.

Socio Demographic Data

ITEM NO.	AGREE	DISAGREE	REMARKS
1			
2			
3			

QUESTIONNAIRE

ITEM NO	AGREE	DISAGREE	REMARKS
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			
13			
14			
15			
16			
17			
18			
19			
20			

INSTRUCTIONS

QUESTIONNAIRE

You are requested to answer all the questions. Pleases answer the following questionsby placing tick mark for appropriate options given in the each question. Each questioncarries only one correct response. This information will be treated as confidential.

SECTION A
BASELINE PERFORMA

1 AGE

a) Below 18 years ☐
b) 18 to 21 years ☐
c) 22-24 years ☐
c) Above 25 years ☐ 2 GENDER
a) Male ☐
b) Female ☐
c) Transgender ☐
d) Others ☐

3 DO YOU HAVE ANY PREVIOUS KNOWLEDGE REGARDING UMBILICALCORD STEM CELL THERAPY?

YES☐ NO ☐

If Yes, Source of knowledge

a) Health personnel ☐
b) Mass media ☐
c) Friends and relatives ☐
d) Others ☐

SECTION B INSTRUCTIONS

You are requested to answer all the questions. Please answer the following questions by placing tick mark for appropriate options given in the each question. Each questioncarries only one correct response. This information will be treated as confidential.

SELF STRUCTURED KNOWLEDGE QUESTIONNAIRE

1. What is stem cell?

a. Cells that can make copies of itself and make more specialized type of cells ☐
b. A cell having the capacity to develop into particular type of cells ☐
c. Cell not capable to renew new cells ☐
d. A cell capable of renewing all type of cell in the body at the time ☐ 2.What are the characteristics of stem cells?
a. Ability to multiply without control ☐
b. Cells that have potential to differentiate into various types of cells in the body ☐
c. Cells that can develop into particular type of cells ☐
d. Cells that do not divide ☐

3. Which among the following is not a source of obtaining stem cells

a. Skin ☐
b. Cord blood ☐
c. Spleen ☐
d. Bone marrow ☐

4. What are the indications of stem cell therapy?

a. Type 1 DM, Cancer, Leukemia ☐
b. Cancer, Anaemia, Kala-azar ☐

c. Type 2 DM, Cancer, Anaemia ☐
d. Cancer, poliomyelitis, Thalassemia ☐

5. Cord blood cells are formed from_____?
a. Embryonic stem cells ☐
b. Tissue specific stem cells ☐
c. Mesenchymal stem cells ☐
d. Induced pluripotent stem cells ☐

6. What is the main source to obtain cord blood from a new born?
a. Placenta ☐
b. Umbilical artery ☐
c. Placental cord unit ☐
d. Blood which come through ☐

7. Which is the least invasive source of stem cells from the human body?
a. Skin ☐
b. Cord blood ☐
c. Bone marrow ☐
d. Spleen ☐

8. What are the different types of stem cells?
a. Embryonic stem cells ☐
b. Fetal stem cells ☐
c. Adult stem cells ☐
d. All of the above ☐

9. Advantages of umbilical cord stem cells?
a. Limited complications ☐
b. Less chance of rejection ☐
c. Limited time for grafting ☐
d. Low risk of contamination ☐

10. What is the age limit of donor for stem cell transplantation?
a. 18-60 YRS ☐
b. 10- 55 YRS ☐
c. UPTO 60 YRS ☐
d. 15- 60 YRS ☐

11. What are the specific preparations needed for a donor fora stem cell transplantation ?
a) Bone marrow biopsy
b) HLA tissue typing
c) CT scan ☐
d) All of the above ☐

12. Who can give consent for stem cell transplantation in case of minor?
a) Doctor ☐
b) Parents ☐
c) Relatives ☐
d) Donor ☐

13. What is cord blood banking?

a. Banking of mother's blood during delivery ☐
b. Banking of newborn's blood in blood bank ☐
c. Banking of a blood from umbilical cord attached to the baby ☐
d. Banking of a blood from embryo ☐

14. When you will collect umbilical cord blood stem cells?
a. 30 min after delivery ☐
b. 30 min before delivery ☐
c. Within 10 min after delivery of the baby ☐
d. Within 10 min after delivery of placenta ☐

15. How much blood should be collected for cord blood banking?
a. 60 ml ☐
b. 70ml ☐
c. 80ml ☐
d. 90ml ☐

16. What is the temperature to store stem cells?
a. 15- 25 Degree Celsius ☐
b. 20-30 Degree Celsius ☐
c. 30-40 Degree Celsius ☐
d. 40-50 Degree Celsius ☐

17. How long cord blood stem cells can be stored?
a. 20 years
b. 15 years
c. 30 years ☐
d. 40 years ☐

18. Which among the following is not a disadvantage of cord blood stem cell therapy?
a. High cost ☐
b. Lack of availability of hospitals ☐
c. Difficult to collect ☐
d. Small amount of stem cells ☐

19. What are the complications of cord blood stem cell therapy?
a. Tumor, Infection,Inappropriate stem cell Migrartion ☐
b. Hemorrhage,Convulsions,Febrile Seizure ☐
c. Risk for rejection, Autoimmune disorder, Leukocytopenia ☐
d. Leukocytopenia, Autoimmune disorder, Tumor ☐

20. What are the complications of delayed collection of cord blood stem cell?
a. Blood cancer ☐
b. Lymphoma ☐
c. Sickle cell anemia ☐
d. All of the above ☐

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ANNEXURE H

ANSWER KEY FOR STRUCTURED KNOWLEDGE QUESTIONNAIRE

1) a	11) d
2) b	12) b
3) c	13) c
4) a	14) d
5) a	15) d
6) c	16) b
7) b	17) a
8) a	18) c
9) b	19) a
10) a	20) d

Lesson Plan On Umbilical Cord Stem Cell Therapy

TOPIC: A study to assess the effectiveness of structured teaching program on knowledge regarding umbilical cord stem cell therapy among health care professional students in selected colleges at Thrissur district.

GROUP: Group 3 PLACE: Chalakudy DURATION: 30 minutes METHOD OF TEACHING: Lecture and discussionTEACHING AIDS: Power point presentation

GENERAL OBJECTIVE:

At the end of the structured teaching program the participants gain in depth knowledge regarding umbilical cord stem cell therapy.

SPECIFIC OBJECTIVES:

- Define stem cell
- Enlist the types of stem cells
- List down the sources of stem cells
- Describe stem cell transplantation
- Define stem cell therapy
- Enlist the indications of stem cell therapy
- Enlist the contraindications of stem cell therapy
- Describe the criteria for stem cell donation
- Describe the procedure of cord blood collection
- List down advantages of stem cell therapy
- List down disadvantages of stem cell therapy
- Explain about cord blood banking
- Explain the complications of stem cell therapy

IME	SPECIFIC OBJECTIVE	CONTENT	TEACHING LEARNING ACTIVITY	AV AIDS	EVALUATION
2 min	Introducingthe topic	INTRODUCTION Blood left in the umbilical cord and placenta after birth is known as umbilical cord blood stem cells. Umbilical cord is the part of placenta that provides nutrients to a fetus, which helps the fetus to survive during intrauterine period. After birth placenta and the umbilical cord blood is rich in stem cells Umbilical cordblood is taken from the umbilical vein after the birth when cord is cut and clamped. Umbilical cord blood is stored in both private and public cord banks. Umbilical cord blood can be stored for up to 30 years. Umbilical cord blood is collected through a noninvasive procedure after birth of child, this procedure is and it doesn't harm the mother and the baby. Stem cells are the modern and new technique to treat life threatening diseases. Stem cell have the most effective therapeutic effect on cancerous cells, they are able to kill and destroy the cancerous cells in the humanbody. In last 10 years umbilical cord blood stem cells has safe to many life of patients, stem cell have been very useful to patient from painful and expensive bone marrow procedure of inborn errors of the metabolism.	Teacher explainsand the group actively listens.	Power point	
1 min	Define stemcells enlist the types of	**STEM CELL** DEFINITION Stem cells are cells that have the ability to divide andproduce both identical stem cells (self-renewal) and differentiate into specialized cells with specific functions. -WHO **TYPES OF STEM CELLS** • Embryonic stem cell • Cord blood stem cell • Adult stem cell			

1 min	stemcells	• Pluripotent stem cells • Hematopoietic stem cells • Mesenchymal stem cells • Neural stem cells • Skin stem cells			
min	List down thesources of stem cells	**SOURCES OF STEM CELLS** Embryonic Stem Cells (ESCs): Derived from embryosusually from in vitro fertilization procedures. Adult Stem Cells (also known as Somatic or Tissue- Specific Stem Cells): Present in specific tissues or organs throughout the body, like bone marrow, brain,skin, and muscle. Induced Pluripotent Stem Cells (iPSCs): Generated byreprogramming adult cells (like skin cells) back to an embryonic-like state using genetic manipulation. Cord Blood Stem Cells: Obtained from the umbilical cord blood after childbirth, containing hematopoieticstem cells. Amniotic Fluid Stem Cells: Found in the amniotic fluidsurrounding a fetus during pregnancy.			

		Adipose (Fat) Tissue Stem Cells: Harvested from fattissues in the body. **EMERGING USES** >Allogenic transplant;-sickle cell anemia-osteoporosis- inherited metabolic disorder -Non-Hodgkin's lymphoma >Autologous transplant;-autoimmune disorder such as,systemic sclerosis - chronic myeloid leukemia >Experimental uses ;-renal cell carcinoma-juvenilechronic arthritis >Others;-type 1 DM-type 2 DM -diabetic ulcers-crohn's disease-Ulcerative colitis-macular degeneration-diabeticretinopathy-hypertension-coronary artery disease-congestive heart failure-hepatitis -liver cirrhosis-stroke-multiple sclerosis-Amyotrophic lateral sclerosis Parkinson's disease-Alzheimer's disease-epileptiform neuralgia -muscular dystrophy			
3min	Define stem cell transplantation	**STEM CELL TRANSPLANTATION** DEFINITION Stem cell transplantation involves the transfer of stem cells from one person to another or from one part of thebody to another. This procedure is an easy and safe way to preserve genetic materials for future therapeutic uses. It can beused as alternative to bone marrow. **TYPES** Autologous Stem Cell Transplantation: In this procedure, a patient's own stem			

		cells are collectedand stored before receiving high-dose chemotherapy or radiation. Afterward, these stored stem cells are returnedto the patient's body to help restore blood cell production.			
2 min 2 min	Define stemcell therapy Enlist the indications of stem cell therapy	Allogeneic Stem Cell Transplantation: This involves using stem cells from a donor, typically a sibling or unrelated donor, whose tissue type closely matches therecipient. Allogeneic transplants require careful matching to reduce the risk of rejection or complications. **STEM CELL THERAPY** Stem cell therapy involves using stem cells to treat or prevent diseases or conditions by repairing, replacing, or regenerating damaged cells or tissues. **INDICATION** >Allogenic transplants; - severe aplastic anemiachronic myeloid leukemia acute myeloid leukemia in first complete remissionMyelodysplasia acute lymphoblastic leukemia infirst completeremission severe congenital immunodeficiency -acute myeloid leukemia and acute lymphoblastic leukemia in second completeremission -thalassemia Autologous transplants; -acute lymphoblastic leukemia -Hodgkin's lymphoma in second complete remission -Hodgkin's disease -solid tumors such as neuroblastoma **CONTRAINDICATION** >Some genetic disorders, Neurofibromatosis tuberousssclerosis, cystic fibrosis and muscular dystrophy >Metabolic disorders or mitochondrial			

2 min	Enlist the contra indications ofstem cell therapy	dysfunction Suggestive physical dysmorphology of the geneticsyndrome. >Threats of impairments >HBV >HIV >Epilepsy			
4min	Describe criteria for stem cell donation	**CRITERIA FOR DONOR IN STEM CELLTHERAPY** Health Status: Donors (usually the mothers) should havea healthy pregnancy without complications that might affect the quality of the cord blood, such as infections, genetic disorders, or certain chronic illnesses. Gestational Age: The cord blood collection is often moresuccessful when the baby is born full-term (at least 37 weeks gestation), as this ensures a sufficient quantity of stem cells. Consent: Donors must provide informed consent for thecollection and storage of the cord blood. They should beinformed about the process, its purpose, and the potential uses of the stored stem cells. Consent should be given by the parents or legal guardians. Screening: Donors may undergo screening for infectiousdiseases to ensure that the collected cord blood is free from transmissible diseases like HIV, hepatitis, and otherinfections.			

		Exclusion Criteria: Some situations or conditions might exclude the collection or storage of cord blood, such as certain maternal health issues, use of certain medicationsduring pregnancy, or specific medical histories. **ETHICS IN STEM CELL COLLECTION** • This is an ethical issue. • To evaluate this technology one must employ some ethical systems that comes from outside ofscience • Encourage development of sound research andtherapy • Prevent any misuse of human embryos and fetus. • Protect patients from fraudulent treatments inthename of stem cell research. • Adult stem cells can be harvested from willingadult donor • Embryonic stem cells are harvested early stageembryos.			
		• This lead to many ethical discussion involvingissues of life and death. • In the future technology may help to reduce these ethical concerns that is reprogram an adultstem cell to behave like an embryonic stem cell. **CORD BLOOD COLLECTION PROCEDURE** Before delivery, maternal blood samples are collected tobe tested for certain infectious diseases. Immediately following the birth but			

		before the placenta is delivered, the cord blood is collected from the baby's umbilical cord by the healthcare provider. After the placenta is delivered, the cord tissue is then collected. There is absolutely no pain or risk to the mother or childduring the collection process because the blood is taken from the cord after it has been clamped and cut. Cord blood and cord tissue collections are safe for bothvaginal and cesarean deliveries.			
3min	Explain the procedure ofcord blood collection	After birth the umbilical cord is clamped and cut. Cord blood is collected from umbilical cord vein byexperts. Collected cord blood is safely packed in proprietary kitsand within 24 hours reach our labs. The sample quality is evaluated and all the required testsare conducted for maximum safety Cord blood is processed by patented **TRANSPORTATION** The standard procedure for transporting fresh cord bloodis to keep it within an ambient temperature range of 15 °C (59 °F) to 25 °C (77 °F).			

		Public cord blood banks set a limit of 48 hours on thetime between birth and processing the blood for cryogenic storage. In the cryopreservation process, the stem cells collectedfrom umbilical cord blood samples, are frozen to sub zero temperatures (Preserved safely under-1960 c). " **PRESERVATION** >After the collection, the cord blood unit is shipped tothe lab and processed and then Cryo- preserved. >However, the unit is processed, a cryopreservant, isadded to the cord blood to allow the survive the cryogenic process. >Cryoprotectants such as glycerol or dimethylsulphoxide >After cryogenic protectants added blood unit should be placed in freezer or extra cold vessels.			
		Example; Nitrogen liquid (-196 degree Celsius). >The parents, until the child become major remains aslegal authority for placental stem cells utilization. Proper maintenance of records. >Confidentiality will be maintained.			

		>Cord blood contain stem cell which is also known ashematopoietic cell or progenitor cell >This stem cell further turn into different cells, like RBC, WBC, Monocyte, Lymphocytes, platelet, B-Cell,T-Cell, NK-cells etc. >This stem cell help to cure 80+ diseases.			
3 min	List down advantages ofcord blood stem cell therapy	**ADVANTAGES** • Have the potential to treat a variety of blood diseases >Matches the recipient more closely. • Less chance of rejection. • Ready supply and does not harm mother or baby. • Umbilical cord blood has the potential to cure 80diseases. • Cord blood is rich, natura, controversy freesource of life saving stem cells. • Does not interfere with birthing process. • Cord blood has a broader match potential than born marrow, which means the patient and donordo not have to be a perfect match • Cord blood stem cell are more resistant to infection have fewer side-effects and requirefewer transplant drug than born marrow stemcells. • There are nearly 10 times as many bloodproducing cells in the cord blood. • This provides more opportunity for futuremedical advancements.			

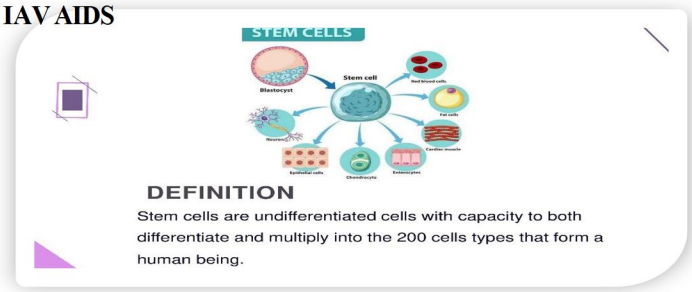
2min 3 min	List down disadvantagesof stem cell therapy Explain aboutcord blood banking	**DISADVANTAGES** • Ones transplanted, no more cells can beharvested from that source. • There is not enough to treat an adult with onecollection. • Cord blood stem cells require more time to graftthan bone marrow transplant. • No nationwide system for collection and storageof donated cord blood. • It is very costly in private bank. • Cord blood volume collected is fixed andrelatively small. • Risk of high contamination. **CORD BLOOD BANKING** Cord blood banking involves collecting and storing stemcells from the umbilical cord blood of a newborn. This blood is rich in hematopoietic stem cells, which have the potential to develop into various types of bloodcells. There are two types of cord blood banking:			
		Public Cord Blood Banking: Donated cord blood is stored in a public bank, making it available for anyonein need of a stem cell transplant. This option allows individuals to contribute to a larger pool of stem cells accessible to patients worldwide. Private Cord Blood Banking: The collected cord bloodis stored specifically for the family's private use. It's preserved in a private bank and reserved for potential future use by the baby or family members. However, this option typically involves subscription fees for storage and may not be accessible to others in need. Deciding whether to bank cord blood and choosing between private or public			

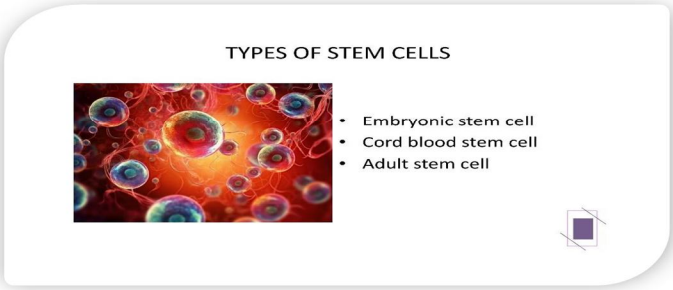
		banking is a personal decisioninfluenced by factors such as family medical history, cost, accessibility, and the likelihood of needing stem cells for medical reasons in the future. **CORD BLOOD BANK IN INDIA** 1. Lifecell International Pvt. Ltd 2004.chennai,Gurugram 2. Cryoviva Biotech India Pvt. Ltd. Gurugram.			
2 min	Enlist complicati onsof stem cell therapy	3. Cordlife Sciences India Pvt. Ltd. 4. Regrow Biosciences Pvt. Ltd. 2009. Maharashtra 5. Cryo stem cell, 2003 6. Cryovault Biotech Pvt. Ltd, 2015, Banglore. 7. Novacord. Haryana 8. Ree Laboratories Pvt. Ltd. 9. Reliance Life Sciences 10. Stemplus Cryopreservation Pvt. Ltd. 11. Stemcyte India Therapeutics Pvt. Ltd. 2008,Gujarat **COMPLICATIONS** 1. Non-Infectious complications; • pancytopenia • skin erythema and mucositis. • hepatic sinusoidal obstruction syndrome. • pulmonary complications: • idiopathic pneumonia syndrome • pulmonary hemorrhage. • pulmonary edema			

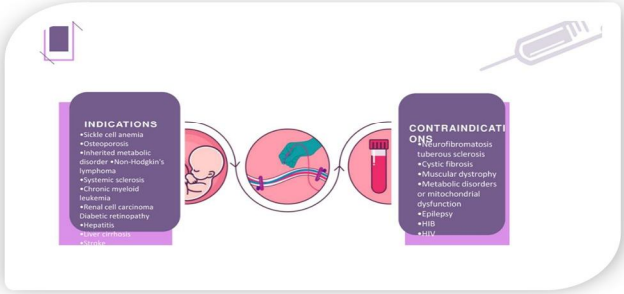
		• cardiac complications: • cardiac failure • acute renal failure • hypertension • Hemorrhagic cystitis • CNS complications: - Delirium - Coma 2. Graft versus host disease. 3. Late effect after HSCT • Endocrine dysfunction - growth retardation • sexual dysfunction • In males delayed puberty • Gonadal failure • Late onset pulmonary complications: -Bronchiolitis Obliterans (BO) • BO with organizing pneumonia (BOOP). • Late idiopathic pneumonia • Obesity and metabolic syndrome • Dental Complications: - cataract - Retinitis • Ocular Sicca syndrome • Neuropsychiatric complication • increased risk of second malignancies.			
		FACTS AND MYTH OF PRIVATE CORD BLOODBANKING >The anxious young and expecting parents are vulnerable to the emotional masking of private cordblood banks >The fact is that autologous cord stem cells cannot be used to cure genetic disorders hemoglobinopathies andstorage disorders include >In hematological malignancies allogenic stem cells aremore preferred >Autologous stem cells are used in high			

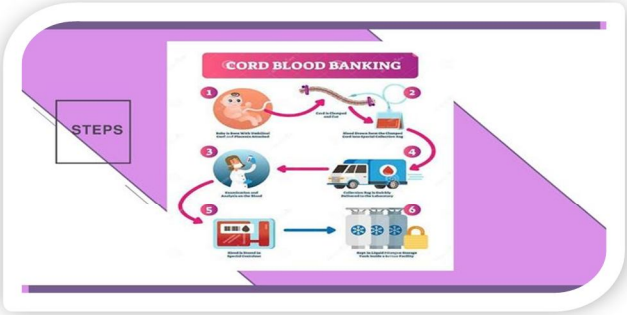
		risk solid tumor >Private banking is highly recommended when there isexisting family member suffering from a condition approved to be used by allogenic stem cell transplantation >Thalassemia is a common non malignant indication forHSCT in India >Unaffected matching sibling donor can be used forthalassemia transplant >Chance of a cord blood being utilized 100 timesgreater in public bank than private bank			
		>Promotional advertisement by private cord blood bankare often misleading for the public. **RECAPTUALIZATION** 1. what is umbilical cord stem cell therapy? 2. what are the applications of umbilical cord stem celltherapy? 3. what are the contraindications of umbilical cord stemcell therapy? 4. what is the procedure for umbilical cord stem cellcollection? 5. what are the advantages and disadvantages ofumbilical cord stem cell therapy? 6. what are the cord blood banks in India? **BIBLIOGRAPHY** 1. Thakur Abhay (2014).Umbilical cord stem cell.http://www.slideshare.net/mobile/Abhay thakur98/umbilical-cord-stem-cell. 2. cord blood banking.https.//www.cryo-cell.com.			
		3. umbilical cord stem cell.https://en.m.wikipedia.org/wiki/cord-blood-bank. 4. Annamma Jacob. stem cell therapy and its importance,A comprehensive text book of midwifery and gynaecological nursing.3rd edition ;2015 5. DC Dutta's textbook of obstetrics:7th edition,2006			

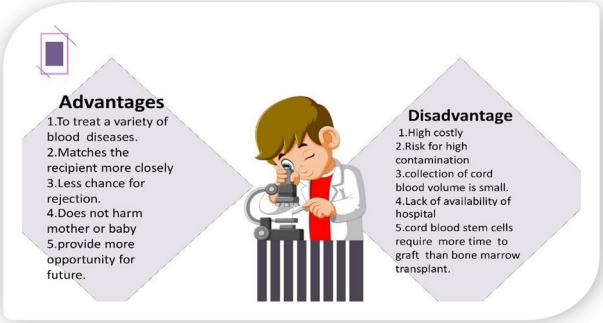
ANNEXURE IAV AIDS

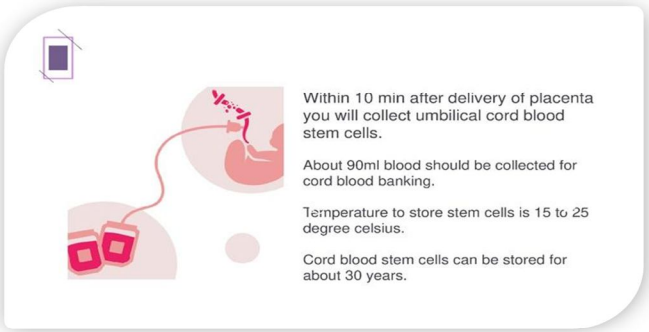


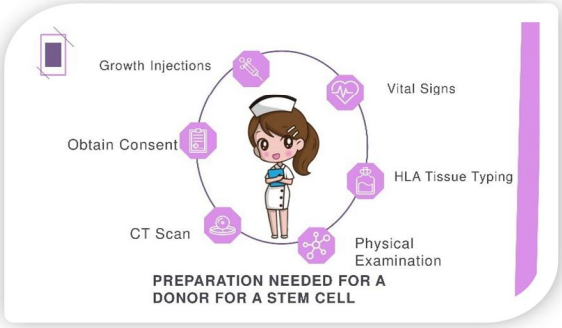












ANNEXURE J MASTER DATA SHEET

SUBJECTS	AGE	GENDER	PREVIOUS KNOWLEDGE
1	b	b	NO
2	b	b	NO
3	b	b	NO
4	b	b	YES/c
5	b	b	YES/b
6	a	b	NO
7	b	b	NO
8	b	b	NO
9	b	b	NO
10	b	b	NO
11	b	b	NO
12	b	b	NO
13	b	a	NO
14	b	a	NO
15	b	b	NO
16	b	b	NO
17	b	b	NO
18	b	b	NO
19	b	b	NO
20	b	b	NO
21	b	b	NO
22	b	b	NO
23	b	b	NO
24	b	b	NO
25	b	b	NO
26	b	b	NO
27	c	b	NO
28	b	b	NO
29	b	b	NO
30	b	b	NO
31	b	b	NO
32	b	b	NO
33	a	a	NO
34	b	a	YES/d
35	b	a	YES/d
36	b	a	NO
37	b	a	YES/c
38	b	b	NO
39	b	b	YES/d
40	b	b	NO
41	b	b	NO
42	b	b	NO
43	b	a	NO
44	b	a	NO
45	b	b	NO
46	b	b	NO

47	b	b	NO
48	b	b	NO
49	b	b	NO
50	b	b	NO
51	b	b	YES/b
52	b	b	NO
53	b	b	NO
54	b	b	NO
55	b	b	NO
56	b	b	NO
57	b	b	NO
58	b	b	NO
59	b	b	NO
60	b	b	NO

NO OF SAMPLES	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Q15	Q16	Q17	Q18	Q19	Q20	TOTAL SCORES
1	0	0	0	1	1	1	0	1	1	1	0	0	1	1	0	0	0	0	0	0	8
2	1	0	1	1	0	0	0	1	0	1	0	0	1	0	0	1	0	0	0	0	7
3	1	0	0	1	1	1	0	1	1	1	0	0	1	0	0	0	0	0	0	0	8
4	0	1	0	0	0	0	0	1	1	0	0	0	1	0	0	0	0	0	0	0	4
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11	1	0	1	0	0	0	0	1	0	1	1	1	1	0	0	0	1	0	0	0	8
12	1	0	0	0	0	0	0	1	0	1	1	1	1	0	0	0	1	1	0	1	9
13	1	1	0	0	0	1	0	1	0	1	0	0	1	0	0	1	0	0	1	0	8
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NO OF SAMPLES	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Q15	Q16	Q17	Q18	Q19	Q20	TOTAL
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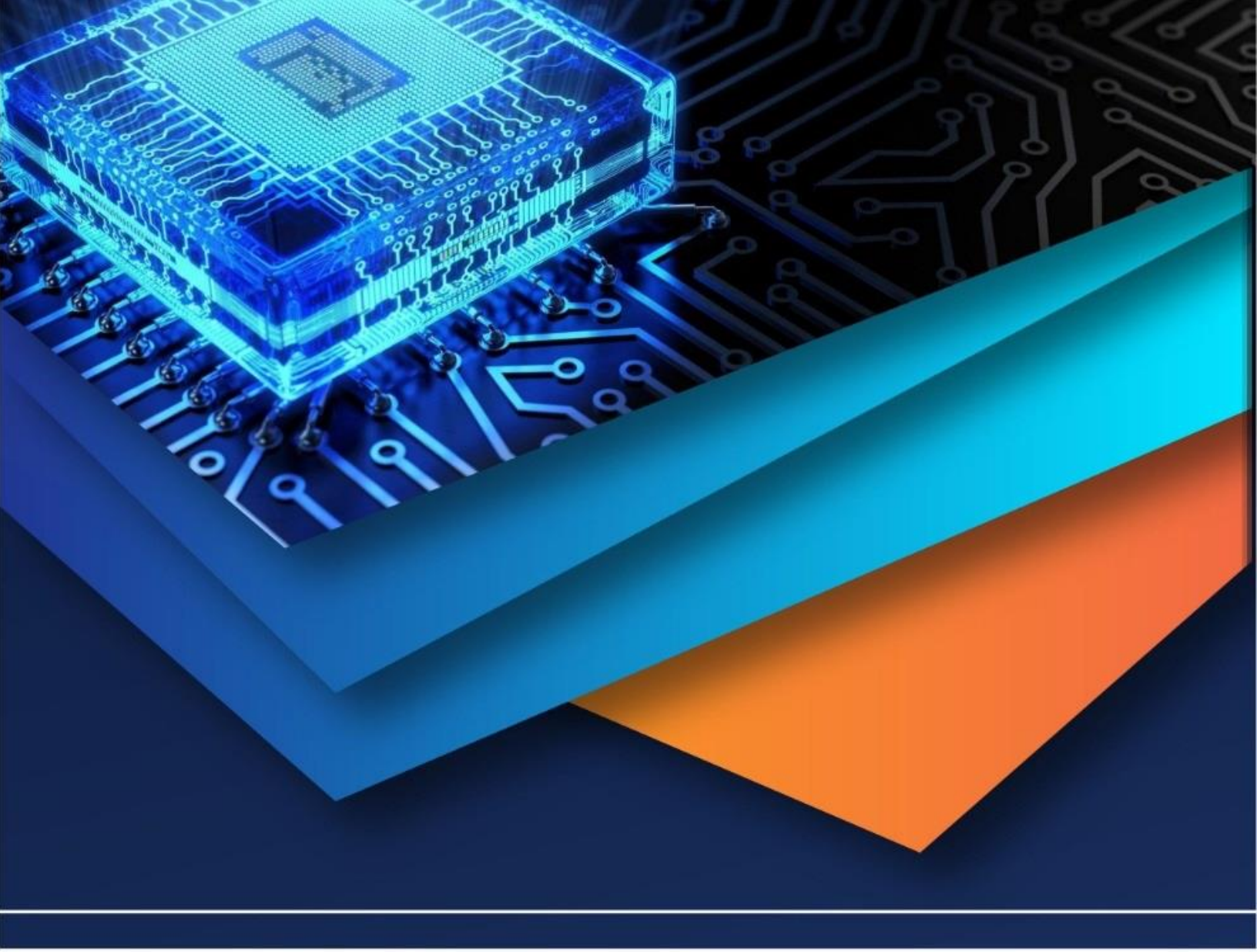

10.22214/IJRASET

45.98

IMPACT FACTOR: 7.129

IMPACT FACTOR: 7.429

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