“A STUDY TO ASSESS THE EFFECTIVENESS OF STRUCTURED TEACHING PROGRAMME ON NANOTECHNOLOGY IN HEALTHCARE AMONG NURSING STUDENTS AT SELECTED NURSING COLLEGES,KOLAR,IN A VIEW TO DEVELOP INFORMATIONAL BOOKLET.”

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PROJECT REPORT SUBMITTED TO

Sri Devaraj Urs College of Nursing, Tamaka, Kolar

As a Part of Curriculum Requirement for The Degree of Basic BSc (N)

UNDER THE GUIDANCE OF

Mrs.Punitha M

HOD of OBG Nursing

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Tamaka, Kolar.

2020-2021

DECLARATION BY THE CANDIDATE

We hereby declare that this research project work entitled **"A STUDY TO ASSESS THE EFFECTIVENESS OF STRUCTURED TEACHING PROGRAMME ON NANOTECHNOLOGY IN HEALTHCARE AMONG NURSING STUDENTS AT SELECTED NURSING COLLEGES,KOLAR, IN A VIEW TO DEVELOP INFORMATIONAL BOOKLET"** is a bonafide and genuine research work carried out by us under the guidance of Mrs.Punitha,HOD in Obstetrical and Gynaecological Nursing, Sri Devaraj Urs College Of Nursing,Tamaka,Kolar.

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CERTIFICATION BY THE GUIDE

This is to certify that this research project work entitled **"A STUDY TO ASSESS THE EFFECTIVENESS OF STRUCTURED TEACHING PROGRAMME ON NANOTECHNOLOGY IN HEALTHCARE AMONG NURSING STUDENTS AT SELECTED NURSING COLLEGES,KOLAR,IN A VIEW TO DEVELOP INFORMATIONAL BOOKLET"** is a bonafide research work done by Ms.Blessy, Ms.Chaithra, Ms.Chinju, Mr.Charan, Ms.Merin, Ms.Neethu, Ms.Nikhitha, Ms.Nirmala, Ms.Nandini and Ms.Gayathri as a part of curriculum requirement for the degree of Basic Bsc(N) program.

Signature of the guide

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ENDORSEMENT BY THE HOD AND PRINCIPAL

This is to certify that the project work entitled **"A STUDY TO ASSESS THE EFFECTIVENESS OF STRUCTURED TEACHING PROGRAMME ON NANOTECHNOLOGY IN HEALTHCARE AMONG NURSING STUDENTS AT SELECTED NURSING COLLEGES,KOLAR, IN A VIEW TO DEVELOP INFORMATIONAL BOOKLET"** is a bonafide research work done by Ms.Blessy, Ms.Chaithra, Ms.Chinju, Mr.Charan, Ms.Merin, Ms.Neethu, Ms.Nikhitha, Ms.Nirmala, Ms.Nandini and Ms.Gayathri under the guidance of Mrs.Punitha M,HOD of Obstetrical and Gynaecological Nursing,Sri Devaraj Urs College Of Nursing, Tamaka, Kolar.

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Thank you very much from all of us!

ABSTRACT

STATEMENT OF THE PROBLEM

"A STUDY TO ASSESS THE EFFECTIVENESS OF STRUCTURED TEACHING PROGRAMME ON NANOTECHNOLOGY IN HEALTHCARE AMONG NURSING STUDENTS AT SELECTED NURSING COLLEGES, KOLAR, IN A VIEW TO DEVELOP INFORMATIONAL BOOKLET"

OBJECTIVES OF THE STUDY

- To assess the level of knowledge on nanotechnology in healthcare using structured knowledge questionnaire.
- To evaluate the effectiveness of structured teaching programme on nanotechnology in healthcare among nursing students by comparing pretest and posttest scores
- To determine the association between knowledge scores with selected demographic variable.

MATERIAL AND METHODS

- Based on the objectives of the study a structured knowledge questionnaire was prepared in English to assess the effectiveness of a structured teaching program on nanotechnology in healthcare among nursing students to develop an informational booklet. The prepared tool was validated by 10 research and subject experts for adequacy and appropriateness. Then, ethical permission was granted from an institutional ethical committee and written approval was secured from the Principal of Sri Devaraj Urs College of Nursing, Tamaka, Kolar.

RESULTS

1. As per the first objective of the study, findings about the Level of Knowledge on Nanotechnology among nursing students were majority 40(80%)of the nursing students had inadequate knowledge regarding nanotechnology in healthcare, 10(20%)had moderate knowledge and none of them had adequate knowledge in the pretest. However, there was an enhancement of knowledge scores in the post-test, ie.50(100%) of the nursing students had adequate knowledge whereas none of the students had moderate knowledge or inadequate knowledge either in the post-tests.

2. By the second objective of the study, evaluation of the Effectiveness of Structured Teaching Programme On Nanotechnology in Healthcare Among Nursing Students by comparing pretest and posttest scores was done and results revealed that the mean knowledge score on the pretest was 8.62 with SD 2.578, whereas the mean score on the post-test was 19.46 with SD 1.515, and the calculated t value was 24.730, indicating highly significant. As a result, the research hypothesis H1 is accepted because there was a difference between the pre-test and post-test knowledge scores.

3. About the third objective of the study, an association between knowledge scores and a chosen demographic variable was conducted. The results showed that there is no significant value association between knowledge scores and socio-demographic variables, and the x2 value is less than the table value (3.84), age (x2=0.79, df=2,p=0.67), gender (x2=0.18, df=2,p=0.91), and year

of study (x2=0.75, df=2,p=0.68). As a result, the premise is disproved because the estimated x2 value is higher than the number in the table.

The inquisitor concluded that the study's results unequivocally disproved the association between structured teaching programs on nanotechnology in healthcare and effectiveness among nursing students.

LIST OF ABBREVIATIONS

Sl.no	Abbreviations
1.	nm:Nanometre
2.	Sd:Standard Deviation
3.	DF:Degree of Freedom
4.	Ns:Not Significant

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CHAPTER-I

INTRODUCTION

As technology advances, the boundaries between different disciplines of technology are blurring -- such as what we are seeing with the use of nanotechnology and information technologies in health care delivery.

INTRODUCTION

Nanotechnology is a fairly recent technological advancement that has the potential to improve medicine while also posing possible hazards to human health and the environment.[1] The study of and production of molecularly scaled materials is known as nanotechnology. It is a field of study that aids in the molecular manipulation of matter, enabling the development of new chemical, physical, and biological technologies. The breadth of a human hair is 100,000 times smaller than a nanometre (nm), which is one billionth of a metre. Smaller than 100 nm particles are known as nanoparticles. The nanoscale gadgets can easily communicate with receptors both outside and inside of cells thanks to their small size. By entering into various areas of the body, they have the capacity to discover diseases and deliver treatment in numerous ways, which was not possible earlier.[2]

The ability to synthesise, manipulate, and visualise matter at the nanometre scale, along with new abilities to access the nanoscale, gave us the previously unheard-of opportunity to directly target at the scale of biomolecular interactions and provided the impetus to develop intelligent nanostructures that could get around the obstacles impeding the success of conventional pharmacological approaches. The 1980s mark the beginning of nanotechnology. After forty years, the gradual blending of bio and nanotechnologies is beginning to change the way we identify, treat, and keep track of illnesses and unresolved medical issues. The first nano-based medications, vaccines, medicines, and diagnostic tools are already being approved for commercialization and clinical usage, even though the majority of the work is still being done in research labs.[3]

Nanotechnology has many uses, including the diagnosis, treatment, and creation of new drugs and drug delivery systems, as well as the protection and improvement of human health, the purification of water, information and communication technologies, and the development of strong yet lightweight materials. With more and more industries adopting nanotechnology, it is playing an increasingly important role in healthcare.

From the patient's perspective, unnecessary drug administration can be avoided, and from the nurse's perspective, unnecessary drug administration and invasive treatments can be delayed until the results are certain.

The application of nanotechnology can help with the creation of new medical diagnostic tools. In fact, measuring substances at the nanoscale (such vitamins and hormones) is quite difficult. Currently, it is possible to measure the chemical at the nanoscale thanks to modern technology like electrochemiluminescence. Additionally, it is also feasible to use nanotechnology for imaging purposes. It is feasible to use a nanoprobe to image cells for medical diagnostic purposes. Quantum dots, plasmonic nanoparticles, magnetic nanoparticles, nanotubes, nanowires, and multifunctional nanomaterials are some examples of the nanoprobes that are currently on the market. Nanoprobes have an advantage in diagnostics because of their high volume/surface ratio, tailorable surfaces, multifunctionality, and inherent characteristics. Without a doubt, nanoprobes can be used to diagnose a variety of diseases.

Likewise, cancer diagnosis and therapy can benefit greatly from applied nanotechnology. Since there is no cure for cancer, there are numerous current studies

looking at new technology, including nanotechnologies, as a means of combating the disease. It is possible to anticipate novel therapeutic techniques with nanomaterials that have an appropriate half-time, low toxicity, and improved chemosensitivity.Tumor-targeted drug delivery systems are viewed as panaceas for cancer therapy, and numerous groups are striving to build reliable systems, according to studies done by Ranganathan et al.[6]

Nanotechnology is showing to be quite effective, especially in the fight against infectious diseases. There is no room for microorganisms to flourish since surface coatings use silver particles. When the disease can be stopped, there is significantly less stress on the nurses since nosocomial infections are prevented. Nanotechnology can be used to prevent the negative side effects of chemotherapy, which makes it simpler for patients to go about their daily lives and for nurses to oversee their care.

The management of numerous ophthalmological illnesses gains new hope with the specialised application of nanotechnology in ophthalmology. Numerous recent studies have documented the creation of novel nanodevices and nanosystems for the treatment of difficult-to-treat eye illnesses.

Nursing and healthcare are gradually being transformed by nanotechnology. It has a significant impact on drug delivery as well. The healthcare industry will need to educate and prepare itself for these developments in drug delivery methods. Nurses should become familiar with the idea of targeted drug therapies in order to be able to discuss these novel treatments with their patients. Doctors and nurses must comprehend the drug metabolism and pharmacokinetics of nanomedicines in order to achieve optimal therapeutic dose.

NEED FOR THE STUDY

The method patient care provided is changing, and this has an impact on the nursing profession. Nanotechnology is one of the cutting-edge technologies that could have an impact on healthcare. Small-scale science, which typically deals with structures between 1 and 100 nm in size (1 nm = 109 m), is the foundation of nanotechnology. It raises concerns about potential health risks to customers, the environment, and workers while also promising to greatly improve industrial processes and create new goods with value (Goyette & Journeay). For instance, according to the Centers for Diseases Control and Prevention [CDC], "nano-sized particles may be more likely to reach the bloodstream and pass through the bloodbrain barrier than bigger particles of the same composition and hence may constitute a unique health threat."

Healthy People (2020) acknowledges the potential advantages and positive effects of nanotechnology on the environment and human health (U. S. Department of Health & Human Services [HHS]). Specific ramifications include the need for new laws and regulations, the need to educate patients and healthcare professionals about the safe and ethical use of nanomaterials, the possibility of fundamental shifts in the roles of patients and healthcare professionals, and new requirements for the practise of informatics. By remaining informed via education and experience, nurses can prevent occupational accidents and illnesses caused by nanoparticle exposure. [2]

Need for the study Five of the nineteen articles had the primary focus on management and safety recommendations on nano-associated occupational hazards. Gilden addressed the need for nurses, and nurse administrators specifically, to first self-educate on the health risks and exposure potentials associated with chemicals used to and clean/sanitize various parts of the facility in order to learn about practices

to reduce exposure to toxic chemicals. Specifically to Nanotechnology, Staggers et al. suggests that clinicians would need education about nanomaterials with special emphasis on the safe use of the new products. Nanotechnology has the ability to provide solutions that are now being researched, such as flow strip chip for diagnosis of malaria infection using nano/microfluidic technologies, nanosomal smartphone-like malaria detection/Nanosomal DNA analyser to detect malaria DNA strain, vapor nanobubbles that detects low levels of malaria infection through the skin in seconds with a laser scanner, and nanocarriers for drug delivery.[3]

Nanomedicine, according to a group of scientists who have studied its applications and the needs of global health, is important for the poor world. They conducted a global survey of researchers and came to the conclusion that nanotechnology could significantly help achieve the health-related MDGs. Specifically, the objectives to fight HIV/AIDS, malaria, and other diseases, as well as to promote mother and child health. Using safer and more effective medications to treat illnesses is also made possible by nanotechnology, which also enables early disease detection. Therefore, the researchers believed that there was a need for increased understanding of nanotechnology's impact on health.[4]

A descriptive study was conducted to assess the Knowledge and awareness of nursing students on the use of nanotechnology in healthcare among 523 undergraduate nursing students Near East University, Faculty of Nursing, Northern Cyprus. Between January and February 2018, information was gathered using an online questionnaire. The students' average age was 21.7 3.9 years, and 61.6% of them were female. Nanotechnology should be employed in medicine, according to 29.4% of students, and for 38.0% of them, it should be used particularly for disease detection and treatment as well as the development of new medical equipment. The

majority of students (38.8%) agreed that reducing time is a benefit of nanotechnology, while 39.1% saw its harmful impacts as a drawback. Additionally, according to the students, it should be employed in the detection and treatment of cardiovascular illness, diabetes mellitus, diabetes, wound healing, and the creation of novel materials. The study's findings indicate that students made an attempt to learn about nanotechnology. The production of new medical equipment and the identification and treatment of diseases were two areas where they believed nanotechnology should be employed more frequently in medicine. According to their research, the top benefits and drawbacks of nanotechnology are time savings and harmful impacts, respectively. We emphasise the significance of including this technology in hospital service training programmes and faculty curricula.

Nurses are in a unique position to promote safety regulations and the moral application of nanotechnology, both for their patients and for themselves. Advocates for the responsible and moral use of nanomaterials are needed on behalf of patients, physicians, public health organisations, the healthcare sector, patients, and society .In order to better prepare the next generation of nurses, nurses should also push for the inclusion of nanotechnology content in nursing education curricula. Healthcare practitioners will need to re-educate themselves, adjust to these changes in drug delivery systems, and grasp the drug metabolism and pharmacokinetics of nanomedicines in order to obtain optimal therapeutic dose.Particularly in research, nurses can play a significant role. There is a need for understanding in many professions, including nursing, healthcare, and others, because nanotechnology is a unique technology. It is important to educate nurses and other healthcare professionals about nanotechnology.

STATEMENT OF THE PROBLEM

"A STUDY TO ASSESS THE EFFECTIVENESS OF STRUCTURED TEACHING PROGRAMME ON NANOTECHNOLOGY IN HEALTHCARE AMONG NURSING STUDENTS AT SELECTED NURSING COLLEGES, KOLAR, IN A VIEW TO DEVELOP INFORMATIONAL BOOKLET"

OBJECTIVES

- To Assess the Level of Knowledge on Nanotechnology in Healthcare Using Structured knowledge Questionnaire.
- To Evaluate the Effectiveness of Structured Teaching Programme On Nanotechnology in Healthcare Among Nursing Students by comparing pretest and posttest scores
- To Determine The Association Between knowledge scores With Selected Demographic Variable.

HYPOTHESIS

H1-There will be a significant difference in the knowledge level of nursing students regarding nanotechnology in healthcare after structured teaching programme.

H2-There will be significant association between knowledge regarding nanotechnology in healthcare and selected demographic variables like age ,gender ,years of study and previous knowledge to similar training programme.

ASSUMPTIONS

1. The nursing students will have some knowledge regarding nanotechnology in healthcare.

2. The structured teaching programme will help to improve the nursing students knowledge regarding nanotechnology in healthcare.

OPERATIONAL DEFINITION

a) **ASSESS:** It refers to the process of measuring the level of knowledge among nursing students on nanotechnology which will be obtained through close ended questionnaire.

b) **EFFECTIVENESS:** In the study it refers to the extent to which the structured teaching programme plays a role in improving the knowledge level of the nursing students by using a structured knowledge questionnaire regarding nanotechnology in healthcare.

c) **KNOWLEDGE:** It refers to response of nursing students to the questionnaire regarding nanotechnology.

d) **NANOTECHNOLOGY IN HEALTH:** Nanotechnology is the term given to those areas of science and engineering where phenomena that take place at dimensions in the nanometer scale. diagnosing diseases delivering drugs and vaccines ,optimal imaging,medical robotics and therapeutic applications.

e) **NURSING STUDENTS:** It refers to the students studying in 3rd and 4th year nursing.

f) **INFORMATIONAL BOOKLET:**A small book that contains information about nanotechnology in health.

CHAPTER-II

REVIEW OF LITERATURE:

REVIEW OF LITERATURE

This chapter discusses a few studies that are pertinent to the goals of the suggested investigation. The investigator gained a deeper understanding of the issue and learned about previous solutions through a review of research and non-research literature pertinent to the study.

It is believed that reviewing relevant literature is a crucial phase in the research process. The review of the literature is an organized, critical examination of the majority of significant scholarly works that have been published, as well as unpublished scholarly print materials and individual materials.

A descriptive study was conducted to assess the Knowledge and awareness of nursing students on the use of nanotechnology in healthcare among 523 undergraduate nursing students at Near East University, Faculty of Nursing, Northern Cyprus. Between January and February 2018, data was collected using an online questionnaire. The students' average age was 21.7 3.9 years, and 61.6% of them were female. Nanotechnology should be employed in medicine, according to 29.4% of students, and for 38.0% of them, it should be used particularly for disease detection and treatment as well as the development of new medical equipment. The majority of students (38.8%) agreed that reducing time is a benefit of nanotechnology, while 39.1% saw its harmful impacts as a drawback. The study's findings indicate that students attempted to learn about nanotechnology.

A quasi-experimental study was organized to evaluate the Effectiveness of Training Programs Given To Nursing Students on Nanotechnology in March 2018

with 135 students in the Health College of Nursing. Questionnaires were used to gather data, and they were distributed twice: before (pretest) and two weeks after a one-hour nanotechnology lecture (post-test). Number, percentage, mean, McNemar test, and Friedman Two-Way Variance Study were employed in the statistical analysis. The pupils' average age was 22.71 1.12. 65.9% of the students said they were interested in professional growth, 32.6% said they were interested in nanotechnology, and 80.0% said they wanted to work in hospitals that utilized nanotechnology. According to the results of 27 questions, it was found that the student's knowledge of nanotechnology was low before the training but improved after it. Additionally, there was a statistically significant difference ($p<0.001$) between pre-education and post-training. The total mean mean score of the students before training (15.45 ± 7.80) and the mean score after training (23.16 ± 5.12)were shown to differ significantly ($p<0.001$)from one another

A cross-sectional study was conducted to determine the nursing student's knowledge levels about nanotechnology and the factors influencing knowledge levels. There is no sample selection in this cross-sectional study of 283 nursing students. Face-to-face procedures were used to gather data from the questionnaires the researchers produced to gauge people's level of understanding of nanotechnology. Chikare, logistic regression analysis, and the SPSS 22.0 package program were used in the analysis. The level of significance was accepted as $p<0.05$. The student's knowledge of nanotechnology rose by about 1.2% to 1.5%($p<0.05$) when mother education increased. A rate of 38.9%–59.0% of students were found to not know linked subjects in the health sector. It was suggested that the subject of

nanotechnology be included in the course material like how science is developing and changing.

A cross-sectional study was organized to assess the knowledge and attitude of dental students and intern practitioners about nanotechnology in dentistry in KSA in 2018.

Through the link shared with dental students and intern practitioners via social networking websites, a survey was made available online. 306 people were included in a straightforward random sample, approximately evenly dispersed among Saudi Arabia's five geographical areas. There were two parts to it: Part A: Biographic and demographic data of the participants. Part B: Knowledge and Attitude toward nanotechnology in dentistry were focused on. Data analysis using statistics was done. To ascertain whether there were any correlations or statistically significant variations between knowledge and attitude of nanotechnology in dentistry and biographic and demographic parameters, frequency distribution and Chi-square analysis were performed. Out of the 306 respondents, 213 (69.3%) said they had heard about nanotechnology, and the majority of those (32.1%) got their information online. Only 26.4% of participants used nanomaterial in their institution, compared to 73.6% who did not. Of these, 52.1% vehemently reject that nanotechnology will find widespread use in the future.

This study found that Saudi Arabia's dental interns and students are not sufficiently informed on the use of nanotechnology in dentistry.

A cross-sectional study was conducted to assess the knowledge of undergraduate students about nanotechnology in dentistry in 2020 in Chennai. By sending 12 questionnaires about nanotechnology to undergraduate dental students, the current study aims to evaluate the knowledge and awareness of nanotechnology in dentistry among those students. SPSS software was used to support the acquired data. The questions were based on information required for dental nanotechnology. Out of 100 respondents, 59% said they were aware of nanotechnology, while 67% said they were using nanomaterials in their clinical work and 72% said they weren't. According to this study, undergraduate dental students are well-versed in nanotechnology.

A cross-sectional study was conducted to evaluate the perception, knowledge, and attitude of medical residents toward nanomedicine using a 35-item questionnaire. Internal medicine residents of all 3 years of postgraduate training at Staten Island University Hospital, a tertiary care teaching hospital in NY, were included in this cross-sectional study. The majority of the 35 items on the questionnaire were divided into 5 sections, which covered demographics, prior education, knowledge of nanotechnology and nanomedicine, opinions on the current and future states of these fields, perceptions of advantages and disadvantages, and attitudes toward nanomedicine. Seventy internal medicine residents in all answered the survey. 96% of the population participated. 63% of the respondents were men, which is the majority. 29 years old on average [25–35]. The remaining participants were evenly split between the second and third postgraduate years, with about half of them in their first year of training. The $\chi 2$ test was used to evaluate correlations between intrinsic factors, heuristics, and attitude toward nanomedicine. The desire to employ nanomedicine to diagnose and treat patients was positively connected with one's

attitude toward the field ($p < 0.05$). The attitude of medical residents toward nanomedicine was favorable. They lacked precise information about the area, though.

A descriptive study was carried out to evaluate the knowledge and behaviors of nurses for nanotechnology use in health. This study was conducted in a university hospital between December 2015 and February 2016. The sample of the study was determined as 210 nurses with the ability to represent 0.05 error level, 0.08 effect size, and 0.95 universes according to the power analysis performed. Nurses were selected by simple random sampling method. The data were collected by the researchers in the form of a questionnaire. Descriptive statistical values were used in the analysis of the data. Results: The mean age of the nurses participating in the study was 35.66'?±6.67 (min:21- max:54), 88.6% were female, 26.2% were working for 20 years, and over, 62.8% graduated from university or had upper education level, 44.3% of them knew about nanotechnology and 65.7% of these nurses was informed about nanotechnology via TV / Internet. 50% of the participants affirmed that nanotechnology was the target, 59.5% said that the use of nanotechnology would improve the quality of life, 50% wanted to work in hospitals where nanotechnology was used, and 43.3% said that the hospitals they were working with were not qualified to use nanotechnology. 48.1% of the nurses stated that nanotechnology would accelerate the diagnosis and treatment of diseases but 52.9% stated that the use of nanotechnology in the diagnosis and treatment process would cause more harm than good. 51.9% of the nurses stated that nanotechnology was not sufficiently interesting in nursing, 54.3% said nanotechnology use will bring new roles to nurses, and 63.3% stated that nurses need specialized nurses for the use of nanotechnology in the health field.

A cross-sectional study was conducted to assess the knowledge and awareness regarding the general concept of nanotechnology among medical and paramedical students of medical colleges. A cross-sectional questionnaire-based study was carried out among postgraduate and undergraduate medical and allied students of the medical college for a period of six months regarding knowledge and awareness about the general concept of nanotechnology. This study included 300 participants. Data from this study showed that both undergraduate and graduate students had a high degree of knowledge and awareness about nanotechnology. The findings indicated that medical and paramedical students had an outstanding grasp of the general idea of nanotechnology.

A comparative study was organized to assess the Knowledge about nanotechnology and intention to use nanomaterials among dental students in Norway and Romania,1st October 2019. A self-administered structured questionnaire including socio-demographics and Ajzen's TPB components was used. A total of 212 out of 732 dental students participated in the survey: 52 Norwegian and 160 Romanian. Most students reported having little knowledge about nanotechnology (Norwegians = 44.2% vs Romanians = 46.9%, $P < .05$). More than 90% of the students in both countries reported that they wanted to get more information about nanotechnology. The mean knowledge score was similar for Norwegian and Romanian students (4.4 ± 1.7 vs 4.2 ± 1.4, $P > .05$). Intention to use nanomaterials in the total sample was most strongly influenced by attitude towards the use of dental nanomaterials (beta = 0.42, $P < .001$).

An observational cross-sectional study was carried out to assess the medical students' knowledge and understanding of concepts related to basic nanotechnology and its applications in nanomedicine among medical students at King Saud University on 23 March 2018. An online questionnaire was sent to all the medical students studying at King Saud University during the summer of 2016 July–August. The study used 162 medical students as its sample size. There were 11 questions total, including both open-ended and fixed-answer questions. 1413 medical students received the questionnaire; 8.72% of them responded. Based on an evaluation of students' perceptions of fundamental nanotechnology, 63.0% (n = 102) of them correctly defined what a nanoparticle is. However, only 40.7% of the students (n = 66) had heard of nanomedicine. 25.3% of the information came from academic institutions, 24.1% from the internet, and 11% from television. The medical students, who made up 81.8% of the class, knew little about the risks and advantages of nanomedicine. It's interesting to notice that 118 students, or 72.8%, believe that nanotechnology is not efficiently used in medicine.

CHAPTER – III
RESEARCH METHODOLOGY

RESEARCH METHODOLOGY

The study's methodology is covered in this chapter. It includes the research approach, research design, setting, sample and sampling technique, development and description of the instruments for data collection, and data analysis.

The research methodology describes the overall structure of how an empirical study is conducted and how to gather trustworthy and valid data for the issue being studied.

Aim Of The Study

The present study aimed to assess the knowledge of nanotechnology in healthcare among nursing students at selected colleges.

Research approach

The research approach is the basic procedure for the research inquiry. The research approach helps the researchers to determine what data to collect and how to analyse it. It also suggests possible conclusions to be drawn from the data

The present study is aimed at "to assess the knowledge on application of nanotechnology in healthcare among nursing students at selected colleges.

For the present study, the researcher used a quantitative research approach.

Research design

A research design is an investigator's overall plan for obtaining answers to the research questions.

For the present study pre- experimental with one group pre-test and post-test design was used. O1 X O2

Pre-test Intervention Post test

Day 1	Day 1	Day 8
O_1	X	O_2
Assessment of demographic variables. Assessment of knowledge using a structured knowledge questionnaire regarding the knowledge on application of nanotechnology in health among nursing students at selected colleges.	Conducting structured teaching Programme on application of nanotechnology in healthcare among nursing students at selected colleges.	Assessment of post interventional knowledge using the same questionnaire

PURPOSE

To assess the knowledge on application of nanotechnology in healthcare among nursing students

SETTINGS

IVth Year Classroom Of Sri Devaraj Urs College Of Nursing, Tamaka, Kolar

SAMPLE AND SAMPLING TECHNIQUE

50 Students, Simple Random Sampling Method

VARIABLES

Independent variable:-structured teaching Programme

Dependent variable: - the knowledge of nanotechnology among nursing students

TOOL

Structured Knowledge Questionnaire

DATA COLLECTION

Data was collected from 50 students

Pre-test by using structured knowledge questionnaire

Lecture cum discussion method

Post-test

Interpretation of study findings and report

VARIABLES

Variables are qualities, properties, or characteristics of persons, things, or situations that change or vary.

Independent variable

The term "independent variable" refers to a variable that is independent of other variables.

In the present study independent variable refers to the structured teaching Programme.

Dependent variable

The variable that the researcher is interested in comprehending, explaining, or predicting is known as the dependent variable.

This study refers to the knowledge of nanotechnology among nursing students.

SETTING OF THE STUDY

The environment in which data collecting takes place is referred to as the setting.

The study was carried out in a fourth-year nursing classroom at Sri Devaraj Urs College of Nursing, Tamaka, Kolar.

POPULATION

The population, also known as the target population, refers to everyone in the group or all the items, such as people or objects, that satisfy specified inclusion requirements for the study.

Sri Devaraj Urs College of Nursing third- and fourth-year BSc nursing students make up the population of the current study.

SAMPLE AND SAMPLE SIZE

A sample is a subset of the population that serves as a representative sample of the complete population.

25 students from the third year and 25 students from the fourth year of the BSc Nursing program at Sri Devaraj Urs College of Nursing in Tamaka, Kolar were chosen as the sample for this study.

SAMPLING TECHNIQUE

Sampling is the method of choosing a population or other component for a study.

The sample for the current study was chosen using a simple random sampling methodology (lottery method).

CRITERIA FOR SELECTING THE SAMPLE

A list of the qualities necessary for inclusion or exclusion in the target population is known as sampling criteria.

Inclusion criteria

Those who are willing to participate in the study.

Students studying in 3rd year and 4th year.

Exclusion criteria

The student who is absent on the day of data collection.

Those who are not willing to participate in the study.

SELECTION AND DEVELOPMENT OF TOOL AND LESSON PLAN

A structured knowledge questionnaire will be used to assess the knowledge of nursing students.

DESCRIPTION OF THE TOOL

Based on the research problem, objective of the study stated, the researcher referred to textbooks, journals, and internet and discussed with the subject and research experts, and prepared the tool under the following section.

SECTION-A: Sociodemographic Variables.

Demographic variables: this first section deals with demographic variables such as age, qualification of nursing students, area of the study, year of the study, and previous knowledge about nanotechnology in health.

SECTION-B: structured questionnaire: structured questionnaire to assess the knowledge on nanotechnology.

Scoring system: for the knowledge questionnaire, the scoring given as the correct answer gets one mark, and the wrong answer gets zero marks. so, the total allotted score was 21. Then the scoring interpretation was given as follows:

- Less than 50%= Inadequate Knowledge
- 50-75%= Moderately Adequate Knowledge
- More than 75%= Adequate Knowledge

DEVELOPMENT OF LESSON PLAN

After consulting textbooks, journals, the internet, and talking with subject experts, the content for the intended health education relating to knowledge of nanotechnology was created under the following headings.

APPLICATION OF NANOTECHNOLOGY IN THE MEDICAL FIELD

- Drug delivery
- Surgery
- Cancer
- Therapeutic application
- Medical instruments
- Drug discovery
- Tissue replacement
- Diagnostic purpose

VALIDITY

Validity refers to the extent to which an instrument measures what it wants to measure.Content validity refers to which a measuring instrument provides adequate coverage of the topic under study.

The prepared instrument was submitted to six departments of Sri Devaraj Urs College of nursing. Questions were modified as per the suggestions of the experts and the final tool was constructed. The final draft consists of 21 items.

Item analysis

Item analysis was done to check the clarity of items' feasibility, reliability, and practicability.Questions with a difficulty index between 30% to 70% are acceptable and with a discriminative value of more than 0.25 to 0.35 was considered good questions.

50 nursing students from Sri Devaraj Urs College of Nursing were given the structured knowledge questionnaire for the current study, and the items' difficulty and

discrimination indices were examined. The discriminating value above 0.25 to 0.35 and the item having difficulty index between 30% and 70% were kept. 21 total items were included in the analysis.

Reliability

Reliability is defined as the degree of consistency or dependability with which an instrument measures the attribute.

To establish reliability the tool was administered to 50 nursing students .Split half method was used to test the reliability of the tool. The r value was 0.80 .hence the tool was found to be reliable to proceed with data collection.

METHOD OF DATA COLLECTION

The data was collected by using the following steps:

Step 1: Ethical clearance was obtained from the institutional ethical committee.

Step 2: Permission was obtained from the principal of Sri Devaraj Urs College of Nursing, Tamaka, Kolar.

Step 3: The sample was selected by using the purposive sampling technique and based on inclusion criteria

Step 4: Informed written consent was obtained from the selected study participant.

Step5: Pre-test was conducted on 21/7/2022 by using a structured knowledge questionnaire.

Step 6: Lecture comes teaching method regarding knowledge of nanotechnology among nursing students with a duration of 1 hour on 22/7/2022.

Step 7: Post-test was conducted on 28/7/2022.

PLAN OF DATA ANALYSIS

The analysis of data requires several close operations such as the establishment of categories, the application of these categories to raw data through coding tabulation, and then drawing statistical inferences

The data obtained were analyzed by using descriptive and inferential statistics.

Statistical analysis of data

The data analysis was done by the following steps:

1. Organization of data in the master sheet.
2. Socio-demographic data were analyzed in the form of frequency and mean percentage.
3. Calculation of mean, mean%, and standard deviation of pre-test and post-test knowledge scores.
4. Paired t-test was used to find out the difference between the mean pre-test and mean post-test knowledge scores.
5. Application of chi-square x2 test to find out the association between a socio-demographic variable with knowledge scores.

SUMMARY

The study's research technique was covered in this chapter. A structured knowledge questionnaire was utilized to collect data from 50 nursing students in a pre-experimental one-group, pre-test, and post-test design. The mean percentage and standard deviation were computed based on the study's goals to determine nursing students' knowledge of nanotechnology. The association between the pre-test and post-test knowledge scores was determined using the paired t-test. x2 test was used to calculate the association.

CHAPTER-IV

DATA ANALYSIS

AND

INTERPRETATION

DATA ANALYSIS AND INTERPRETATION

Data analysis is defined as the systematic organization and synthesis of research data and the testing of the research hypothesis using the provided data.

This chapter deals with the analysis and interpretation of the data collected,to assess the effectiveness of a structured teaching program on nanotechnology in healthcare among nursing students at selected nursing colleges, Kolar**.**

The findings were analyzed based on the objectives of the study.

OBJECTIVES OF THE STUDY

The objectives of the study are to:

1. To assess the level of knowledge on nanotechnology in healthcare using structured knowledge questionnaire.
2. To evaluate the effectiveness of a structured teaching programme on nanotechnology in healthcare among nursing students by comparing pretest and posttest scores.
3. To determine the association between knowledge scores with selected demographic variable.

ORGANIZATION OF DATA

Based on the objectives of the study, the data was collected and organized, analyzed, tabulated, and presented under the following sections:

SECTION-I

- This section assigns the data pertaining to the first objective of the study to assess the Level of Knowledge on Nanotechnology in Healthcare Using a Structured Knowledge Questionnaire.

SECTION- II

- This section assigns with evaluating the effectiveness of a structured teaching programme on nanotechnology in healthcare among nursing students by comparing pretest and post-test scores.

SECTION –III

- This section is assigned to determining the association between knowledge scores with selected demographic variables.

Distribution of study participants according to their selected socio-demographic variables.

TABLE-1: Frequency and percentage distribution of the study participants according to their socio-demographic variables.

SL.NO	VARIABLES	f	%
1.	**1)Age in years**		
	A. 19-20years	17	34%
	B. 21-22 years	22	44%
	C. 23-24 years	11	22%
2.	**2)GENDER**		
	A. Male	10	20%
	B. Female	40	80%
3.	**3)YEAR OF STUDY**		
	A. 3RD Year BSC(N)	25	50%
	B. 4TH Year BSC(N)	25	50%

n=50

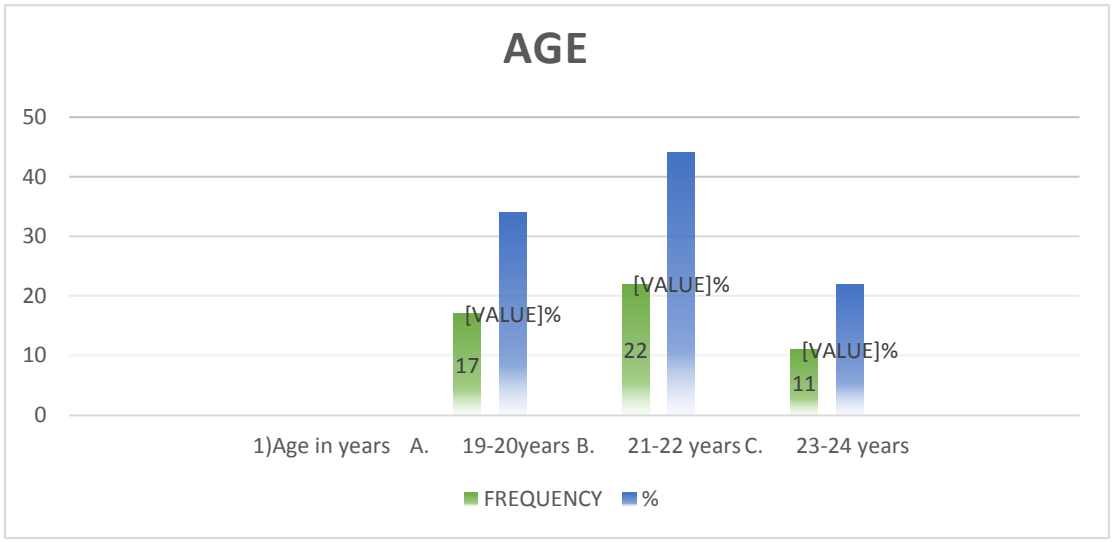


Fig-1:Distribution of study participants according to age

Figure:1-3: Frequency and percentage distribution of the study participants according to their socio-demographic variables.

n=50

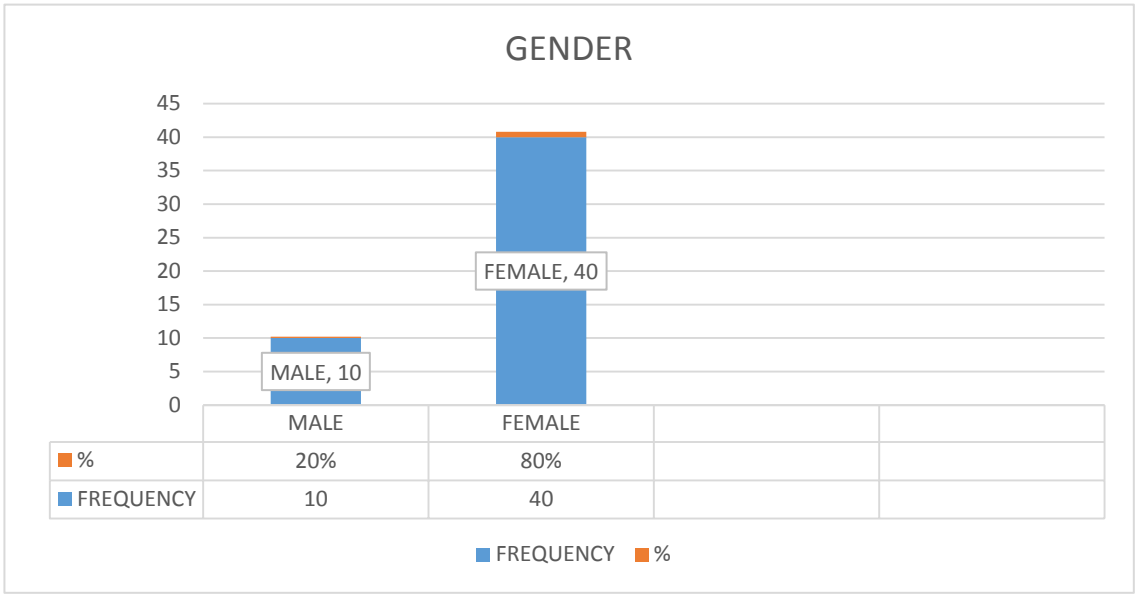


Fig-2: Distribution of study participants according to gender

n=50

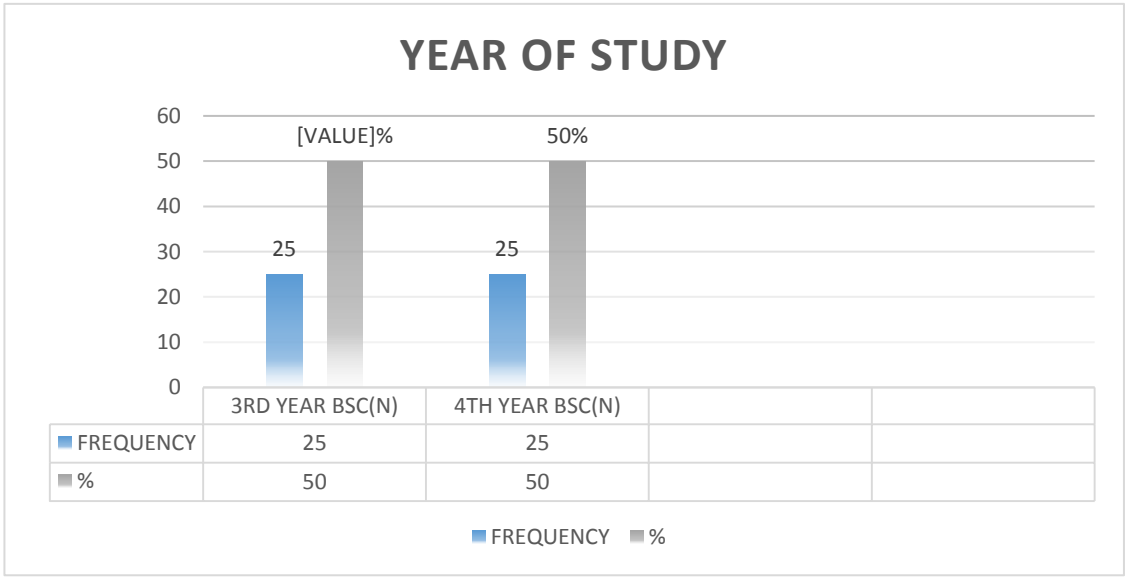


Fig-3: Distribution of study participants according to a year of study

Table 1 and figures 1-3 reveal the socio-demographic variables of the study participants.

1. AGE

Of the study's participants, 44%(22) were between the ages of 21 and 22; 34%(17) were between the ages of 19 and 20, and 22%(11) were between the ages of 23 and 24.

2. GENDER

In terms of gender, there were 20%(10) male study participants and 80%(40) female research participants.

3. YEAR OF STUDY

In the 50 samples, 50% (25 participants) of the study participants were from the third year of BSc (N), and 50% (25 participants) were from the fourth year of BSc (N).

SECTION – I

This section assigned with the data about the first objective of the study to assess the Level of Knowledge on Nanotechnology in Healthcare Using a Structured Knowledge Questionnaire.

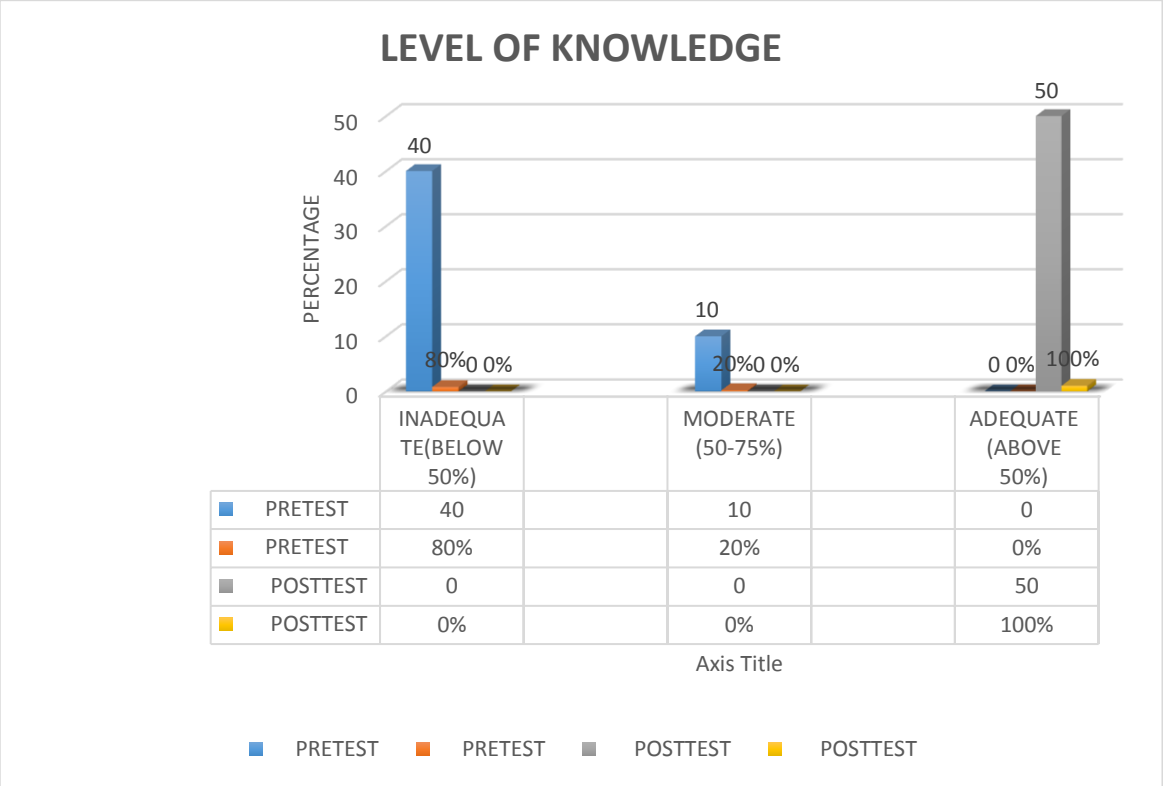
Table-2:Distribution of study participants according to the overall knowledge

LEVEL OF KNOWLEDGE	PRETEST		POSTTEST	
	f	%	f	%
INADEQUATE (BELOW 50%)	40	80%	0	0%
MODERATE (50-75%)	10	20%	0	0%
ADEQUATE (ABOVE 50%)	0	0%	50	100%

Table 2 reveals that the majority 40(80%)of the nursing students had inadequate knowledge regarding nanotechnology in healthcare, 10(20%)had moderate knowledge and none of them had adequate knowledge in the pretest. However, there was an improvement in knowledge scores on the post-test; 50 (100%) of the nursing students scored as having adequate knowledge, while none of the other students scored as having intermediate or inadequate knowledge. It showed that nursing students' overall knowledge scores on the use of nanotechnology in healthcare had improved.

Table 3: Distribution of overall mean and SD knowledge scores of nursing students regarding nanotechnology in healthcare.

TOTAL NO.OF QUESTIONS	MAXIMUM SCORE	PRE-TEST			POST-TEST		
		MEAN	SD	MEAN%	MEAN	SD	MEAN%
21	21	8.62	2.58	41.04	19.46	1.51	92.66



According to Table 3, the respondents' pre-test average was 8.62 with a 2.58 SD and a mean percentage of 41.04%, which suggests insufficient knowledge. The individuals had a mean post-test score of 19.46, a standard deviation of 1.51, and a mean percentage of 92.66%, according to the overall post-test score. The average knowledge gap was 10.84. It showed that overall knowledge ratings regarding the use of nanotechnology in healthcare have improved.

SECTION- II

This section assign with evaluating the effectiveness of structured teaching programme on nanotechnology in healthcare among nursing students by comparing pretest and posttest scores.

Table 4: Comparison of pre-test and post-test knowledge scores of nursing students regarding nanotechnology in healthcare.

Knowledge	Mean	SD	t-value	Inferences
Pre-test	8.620000	2.578	24.730	S**
Post-test	19.46	1.515		

table value at $df_2 = 5.99$

S – Significant

According to Table 4, the pretest revealed mean knowledge scores of 8.62 with SD 2.578, whereas the posttest revealed mean scores of 19.46 with SD 1.515 and a computed t value of 24.730, showing extremely significant differences. As a result, the research hypothesis H1 is accepted because there was a difference between the pre-test and post-test knowledge scores.

SECTION –III

This section assign with determining the association between knowledge scores with selected demographic variable.

Table 5: Association between knowledge scores with selected demographic variables.

VARIABLES	KNOWLEDGE LEVEL			Df	X^2	P-Value	Inference
	Inadequate	Moderate	Adequate				
1)AGE IN YEARS							
A. Below 20 years	6	7	4	2	0.79	0.67	>0.05 NS
B. Above 20 years	16	11	6				
2)GENDER							
A. MALE	6	3	1	2	0.18	0.91	>0.05 NS
B. FEMALE	22	12	6				
3)YEAR OF STUDY							
A. 3RD year BSC(N)	13	6	6	2	0.75	O.68	>0.05 NS
B. 4TH year BSC(N)	10	8	7				

NOTE: P<0.05, NS-NON SIGNIFICANT, Df-2(5.99)

Association of knowledge score with selected socio-demographic variables.

- The last objective disclosed that there is no significant value association amidst the knowledge score and sociodemographic variables and the x2 value is less than the table value(3.84), age (x2=0.79,df=2,p=0.67), gender (x2=0.18,df=2,p=0.91) and year of study (x2=0.75,df=2,p=0.68). Thus, the stated assumption is rejected as the calculated x2 value is more than the table value.

Finally, the inquisitor finalized that the findings of the study clearly showed that the effectiveness of a structured teaching program on nanotechnology in healthcare among nursing students is not associated.

SUMMARY

The analysis and interpretation of the study's findings have been the focus of this chapter. The data analysis was completed based on the objectives and hypotheses, and the results are shown in the tables and figures. The demographic information was represented by frequency and percentage, while knowledge was examined using mean, mean percentage, and standard deviation. Using a paired t-test, the significance of the difference between the pre-and post-tests was examined. Using the chi-square test, the relationship between nursing students' understanding of nanotechnology in healthcare and specific demographic factors was evaluated.

CHAPTER-V

DISCUSSION

DISCUSSION

This chapter deals with the major finding of the study and discusses them about similar studies conducted by the other researcher.

The study aimed to assess the effectiveness of a structured teaching program on nanotechnology in healthcare among nursing students at selected nursing colleges, Kolar, in a view to developing an informational booklet.

Data collection and analysis were carried out based on the objectives of the study.

OBJECTIVES OF THE STUDY

1. To Assess the Level of Knowledge on Nanotechnology in Healthcare Using Structured Knowledge Questionnaire.
2. To Evaluate the Effectiveness of a Structured Teaching Programme On Nanotechnology in Healthcare Among Nursing Students by comparing pretest and posttest scores.
3. To Determine The Association Between knowledge scores With Selected Demographic Variable.

The first objective of the study was to assess the level of knowledge on nanotechnology in healthcare using a structured knowledge questionnaire.

- The findings of the study (Table 2) revealed that the majority 40(80%)of the nursing students had inadequate knowledge regarding nanotechnology in healthcare, 10(20%)had moderate knowledge and none of them had adequate knowledge in the pretest.

A similar study was conducted on"Assessment of knowledge about nanotechnology in dentistry amongst dental postgraduate students in India: An online cross-sectional survey**.** The results showed that out of 328 participants, 44.80% were from I MDS, 35.40% were from II MDS, and 19.80% were from III MDS. The postgraduate dental students in India had adequate knowledge regarding fourteen out of twenty questions. The students, however, did not have adequate knowledge regarding six questions which comprised history, tools, and techniques about nanotechnology in dentistry.

The second objective of the study was to find out the effectiveness of the Structured Teaching Programme On Nanotechnology in Healthcare Among Nursing Students by comparing pretest and post-test scores.

- The findings of the study revealed that the pretest means the percentage of knowledge scores obtained by nursing students regarding nanotechnology in healthcare was 41.04% which is found to be inadequate knowledge, whereas post-test knowledge scores were 92.66% which is higher than pretest scores which indicated adequate knowledge. Thus the findings of the study revealed that there was a statistically significant difference between the pre-test and post-test knowledge scores. Hence the research hypothesis is accepted. The study findings indicated that the Structured Teaching on nanotechnology in healthcare was effective.
- The present study is supported by the study" NANOTECHNOLOGY: AN EDUCATIONAL PROGRAM FOR NURSES ' whereby the results showed that: A pre-and post-test format design was utilized to examine the effect of the educational program on participants' knowledge about Nanotechnology. The results from the knowledge surveys showed an increase of 77.1% in

knowledge about Nanotechnology among the participants. Qualitative comments reflected the positive response towards the educational program.

The third objective of the study was to determine the association between knowledge scores with selected demographic variables.

- Regarding the association of knowledge scores with selected sociodemographic variables like age, gender, and year of the study revealed that there was no significant association between the knowledge scores of nursing students with age(χ 2 =0.79), gender(χ 2 =0.18) year of study (χ 2 =o.75) on nanotechnology in healthcare at 0.05 level of significance. The obtained χ2 value was less than the table value (3.84). Hence the research hypothesis H2 was rejected.

The present study findings were consistent with the study Knowledge about nanotechnology and intention to use nanomaterials: A comparative study among dental students in Norway and Romania. The results showed that a total of 212 out of 732 dental students participated in the survey: 52 Norwegian and 160 Romanian. Most students reported having little knowledge about nanotechnology (Norwegians = 44.2% vs Romanians = 46.9%, P < .05). More than 90% of the students in both countries reported that they wanted to get more information about nanotechnology.

Testing of the hypothesis

- H1-There will be a significant difference in the knowledge level of nursing students regarding nanotechnology in healthcare after a structured teaching program.

There was a significant difference between pre-test and post-test knowledge scores which was determined by the paired t-test (t29 =24.730) at a 0.05 level. Hence the stated research hypothesis H1 is accepted.

- H2- There will be a significant association between knowledge regarding nanotechnology in healthcare and selected demographic variables like age, gender, years of study, and previous knowledge of similar training programs.

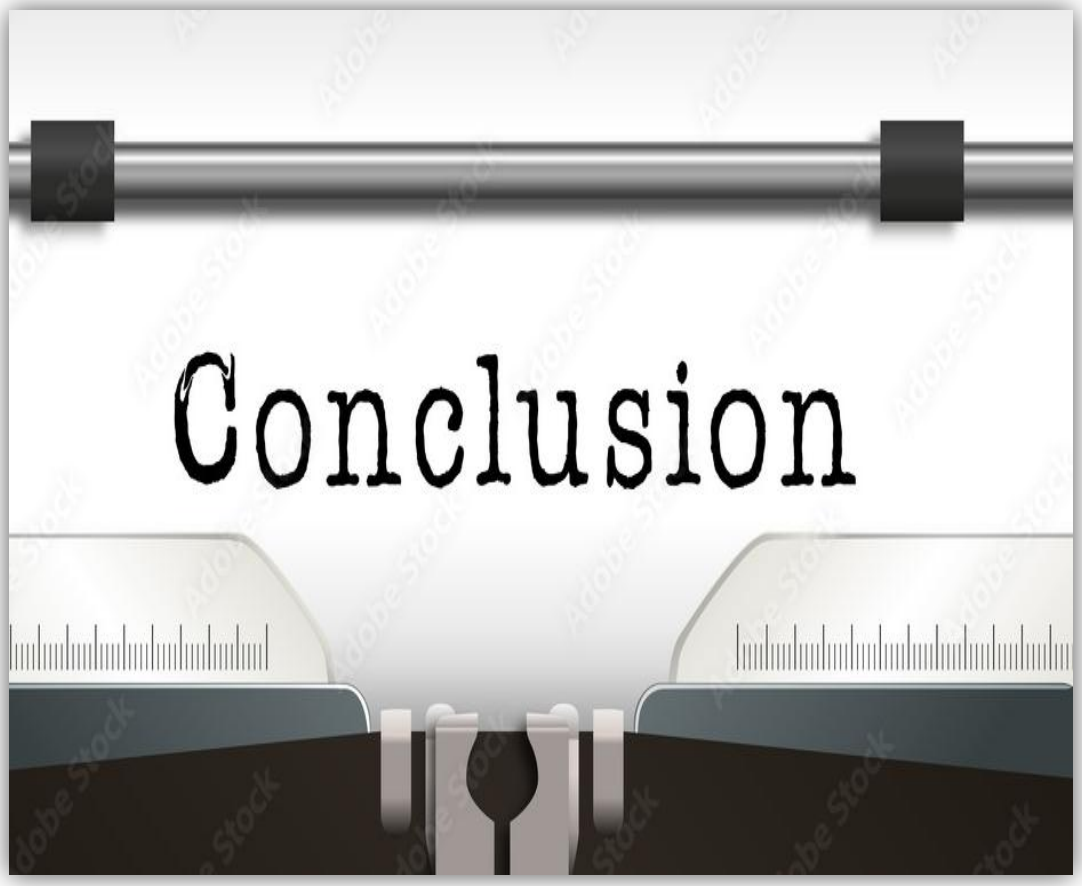
  There was no significant association between the post-test knowledge scores of nursing students with selected demographic variables such as age, gender, and year of study on nanotechnology in healthcare.

CONCLUSION

The findings of the study revealed that the difference between the pre-test and post-test knowledge scores was statistically significant at a 0.05 level. There was no statistically significant association between nursing students' post-test knowledge scores with selected demographic variables such as age, gender, and year of study on nanotechnology in healthcare. Hence the Structured Teaching Programme on nanotechnology in healthcare was effective.

CHAPTER-VI

CONCLUSION AND SUMMARY



CONCLUSION AND SUMMARY

This chapter presents the summary, conclusion, implications, and recommendations made. The current study was organized Assess The Effectiveness Of a Structured Teaching Programme On Nanotechnology In Healthcare Among Nursing Students At Selected Nursing Colleges, Kolar, In A View To Develop an Informational Booklet."

A descriptive research survey design was adopted to assess The Effectiveness Of the Structured Teaching Programme On Nanotechnology In Healthcare Among Nursing Students At Selected Nursing Colleges, Kolar.

The study was organized at Sri Devaraj Urs College of Nursing, Tamaka, Kolar. The sample of the study consisted of 50 nursing students studying at Sri Devaraj Urs College of Nursing. The simple random sampling technique or lottery method was adopted in selecting the sample of the study. The data was collected from the samples by using a structured knowledge questionnaire.

Major findings of the study:

Findings related to assessing the Level of Knowledge on Nanotechnology in Healthcare Using a Structured Knowledge Questionnaire.

The major findings of the study revealed that the majority 40(80%)of the nursing students had inadequate knowledge regarding nanotechnology in healthcare, 10(20%)had moderate knowledge and none of them had adequate knowledge in the pretest. However, there was an enhancement of knowledge scores in the post-test, ie.50(100%) of the nursing students had adequate knowledge whereas none of the

students had moderate knowledge or inadequate knowledge either in the post-test. It indicated that there was an enhancement in the overall knowledge scores of nursing students regarding nanotechnology in healthcare.

1. Findings related to the effectiveness of structured teaching programs on nanotechnology in healthcare among nursing students by comparing pretest and posttest scores. means overall pre-test means percentage of knowledge scores obtained by nursing students on nanotechnology in healthcare was 41.04% which is found to be inadequate knowledge, whereas the post-test knowledge score was 92.66% which is higher than the pretest scores which indicated adequate knowledge.
2. Findings related to the association between demographic variables and knowledge scores

The association of knowledge scores with selected socio-demographic variables like age, gender, and year of the study revealed that there was no significant association between the knowledge scores of nursing students with age(χ 2 =0.79), gender(χ 2 =0.18) year of study (χ 2 =o.75) on nanotechnology in healthcare at 0.05 level of significance. The obtained χ2 value was less than the table value (3.84). Hence the research hypothesis H2 was rejected.

The overall findings of the study clearly showed that the structured teaching program is significantly effective in improving the knowledge of nursing students regarding nanotechnology in healthcare.

NURSING IMPLICATIONS

Nurses are in a unique position to promote safety regulations and the moral application of nanotechnology, both for their patients and for themselves. Advocates for the responsible and moral use of nanomaterials are needed on behalf of patients, physicians, public health organizations, the healthcare sector, patients, and society (Staggers et al., 2008). To better prepare the next generation of nurses, nurses can also push for the inclusion of nanotechnology content in nursing curricula. Healthcare practitioners will need to re-educate themselves, adjust to these changes in drug delivery systems, and comprehend drug metabolism and pharmacokinetics to obtain proper therapeutic doses, according to Bryant, Chuoke, Inocencio, and Arrieta (2009). Particularly regarding the influence of nanotechnology on nursing knowledge and practice, nurses can play a significant role in research. In the end, nurses' input may have an impact on the formulation of nanotechnology safety regulations.

NURSING PRACTICE

Nursing professionals working in the hospital should have adequate knowledge of nanotechnology and its healthcare applications. Nursing professionals should enhance their knowledge regarding the applications of nanotechnology in healthcare using a structured knowledge questionnaire.

NURSING EDUCATION

Before a nurse can utilize their practices, they need to have a strong foundation in terms of education. Awareness needs to be created among nursing students regarding nanotechnology in healthcare. Teaching strategies such as demonstrations, self-learning procedure manuals, and structured teaching programs can be used to train

nursing students. Nurse educators can teach students about nanotechnology and its applications in healthcare to acquire adequate knowledge.

NURSING ADMINISTRATION

The administrator nurse has a significant impact on professional development and policy-making in areas like counseling, referral services, and public health education. All students should be observed by a nurse acting in the capacity of an administrator to see whether they are receiving enough health education regarding nanotechnology and its uses in healthcare. As a nurse administrator, you can organize special training programs, in-service education, and counseling training on nanotechnology and its uses in healthcare. For BSc(N) students, nurse administrators can plan health education programs to update their knowledge.

NURSING RESEARCH

Nursing research is inspired by nursing practice. The cornerstone of professional nursing practice that will improve the standard of patient care and serve as the basis for nursing care is evidence-based practice. To develop principles for evidence-based practice, nurses must work as a team to conduct numerous studies. Based on the study results, it can be concluded that the majority of nursing students lacked awareness of the use of nanotechnology in healthcare during the pre-test. The researchers might carry out additional research on awareness and the advancement of alternate approaches for the advancement of nanotechnology in healthcare. The knowledge gap that exists among nursing students can be found with the aid of nursing research. This will contribute to raising the standard and caliber of nursing care that is based on research.

RECOMMENDATIONS

A comparative study on the use of nanotechnology in healthcare can be repeated with sizable sample size.

1. Health professionals should regularly host programs that inform the public about nanotechnology and its uses in healthcare.
2. A similar study to determine the efficacy of the nursing education program can be carried out with additional groups of students.

LIMITATIONS

The study did not examine nursing students' attitudes toward the use of nanotechnology in healthcare.

1. Because there are only 50 samples in the study, the generalizability is constrained.
2. There was no control group in the study. The investigator had little control over how information from books, journals, classes, and the media might have affected the results.
3. No additional techniques or tools are utilized to measure the knowledge of nursing students; the samples are only evaluated using a standardized knowledge questionnaire.

SUMMARY

The chapter outlines the result reached, their consequences and restrictions, as well as ideas and proposals for additional research.

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First published: 01 October 2019
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https://onlinelibrary.wiley.com/doi/full/10.1111/eje.12470

ANNEXURES

ANNEXURE-A

ETHICAL CLEARANCE

8	To assess the knowledge on nanotechnology in health among nursing students at selected nursing colleges,kolar,in a view to deve.op informational booklet."	Mrs. Punitha	Blessy bennichan Charan chandra Chaithra s Chinju m Merin martin Nandini m Neethu ks Nikhitha kp nirmala chettri Gayathri	Accepted
9	"A study to assess the effectiveness of planned teaching program on knowledge on management of feco-oral (5f's- food, fingers, fields, feces, flies) disease transmission among anganavyadi workers and helpers in selected community area"	Dr. Malathi KV	Jaimy martin Kavitha Jayashree raju a.r Christeena e.b Esther merin sam Megha raj Greeshma.a Elsa jenitta rodrigues Mereena mathew	Accepted
10	"A Study To Evaluate The Effectiveness Of Home-Made Turmeric Mask In Reducing Chloasma Facie Among Women At Selected Villages, Kolar."	Mrs. Gayathri k.v	Divya g.a Elizabeth antony Karuna kumari syangtan Kaviya Keziya Liji thomas Maria somy Mariya joseph Manisha.s	Accepted

8	To assess the knowledge on nanotechnology in health among nursing students at selected nursing colleges,kolar,in a view to develop informational booklet."	Mrs. Punitha	Blessy bennichan Charan chandra Chaithra s Chinju m Merin martin Nandini m Neethu ks Nikhitha kp nirmala chettri Gayathri	Accepted
9	"A study to assess the effectiveness of planned teaching program on knowledge on management of feco-oral (5f's- food, fingers, fields, feces, flies) disease transmission among anganawadi workers and helpers in selected community area"	Dr. Malathi KV	Jaimy martin Kavitha Jayashree raju a.r. Christeena e.b Esther merin sam Megha raj Greeshma.a Elsa jenitta rodrigues Mereena mathew	Accepted
10	"A Study To Evaluate The Effectiveness Of Home-Made Turmeric Mask In Reducing Chloasma Faciei Among Women At Selected Villages, Kolar."	Mrs. Gayathri k.v	Divya g.a Elizabeth antony Karuna kumari syangtan Kaviya Keziya Liji thomas Maria somy Mariya joseph Manisha.s	Accepted

11	A study to assess the attitude on nursing profession and its practice among newly enrolled students at selected college, Kolar	Prof. Mary Minerva	Athira s Mareena joseph Preethi Maria varghese Meghana L Merlin elizabeth Nanditha c Naveenkumar k s Sreelakshmi	Accepted

Sl. No.	Name	Signature
1	Dr.V.Lakshmaiah	Absent
2	Dr. Mohan	Absent
3	Dr.Bhuvana	present
4	Mr.Sridhar	Absent
5	Mr.Suresh	present
6	Swamy Acharyananda Avadutha	present
7	Mrs.Lakshmi	Absent

Member Secretary

MEMBER SECRETARY
IEC COMMITTEE
SRI VARU COLLEGE OF NURSING
TAMAKA KOLAR - 563103.

Chairperson

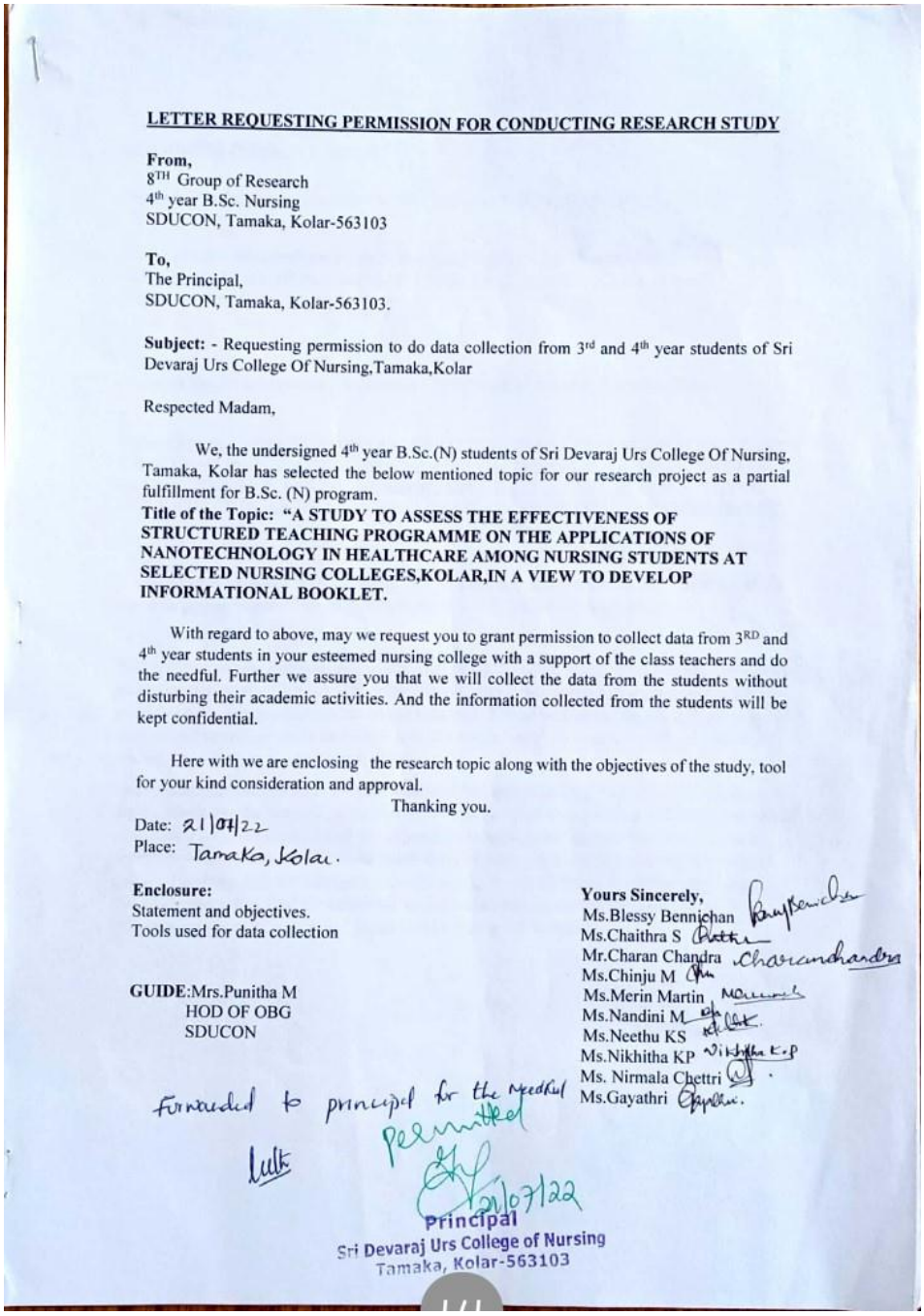
CHAIR PERSON
IEC (Human studies)

ANNEXURE-B

SRI DEVARAJ URS COLLEGE OF NURSING

TAMAKA, KOLAR-563101

LETTER SEEKING PERMISSION TO CONDUCT THE STUDY



LETTER REQUESTING PERMISSION FOR CONDUCTING RESEARCH STUDY

From,
8TH Group of Research
4th year B.Sc. Nursing
SDUCON, Tamaka, Kolar-563103

To,
The Principal,
SDUCON, Tamaka, Kolar-563103.

Subject: - Requesting permission to do data collection from 3rd and 4th year students of Sri Devaraj Urs College Of Nursing,Tamaka,Kolar

Respected Madam,

We, the undersigned 4th year B.Sc.(N) students of Sri Devaraj Urs College Of Nursing, Tamaka, Kolar has selected the below mentioned topic for our research project as a partial fulfillment for B.Sc. (N) program.

Title of the Topic: "A STUDY TO ASSESS THE EFFECTIVENESS OF STRUCTURED TEACHING PROGRAMME ON THE APPLICATIONS OF NANOTECHNOLOGY IN HEALTHCARE AMONG NURSING STUDENTS AT SELECTED NURSING COLLEGES,KOLAR,IN A VIEW TO DEVELOP INFORMATIONAL BOOKLET.

With regard to above, may we request you to grant permission to collect data from 3RD and 4th year students in your esteemed nursing college with a support of the class teachers and do the needful. Further we assure you that we will collect the data from the students without disturbing their academic activities. And the information collected from the students will be kept confidential.

Here with we are enclosing the research topic along with the objectives of the study, tool for your kind consideration and approval.

Thanking you.

Date: 21/07/22
Place: Tamaka, Kolar.

Enclosure:
Statement and objectives.
Tools used for data collection

Yours Sincerely,
Ms.Blessy Bennichan
Ms.Chaithra S
Mr.Charan Chandra
Ms.Chinju M
Ms.Merin Martin
Ms.Nandini M
Ms.Neethu KS
Ms.Nikhitha KP
Ms. Nirmala Chettri
Ms.Gayathri

GUIDE:Mrs.Punitha M
HOD OF OBG
SDUCON

Forwarded to principal for the needful

Permitted

21/07/22

Principal
Sri Devaraj Urs College of Nursing
Tamaka, Kolar-563103

ANNEXURE-C

LETTER REQUESTING SUGGESTIONS AND PERMISSION OF EXPERTS

FOR ESTABLISHING CONTENT VALIDITY FOR RESEARCH TOOL.

From,

IIIrd year BSc. Nursing students
Sri Devaraj Urs College of Nursing
Tamaka Kolar- 563103

To,

Respected Madam/Sir

Subject: Request for expert suggestions and permission to establish content validity of the research tool.

With reference to the subject citied above, we, the 3rd year BSc Nursing students of Sri Devaraj Urs College of Nursing, Tamaka, Kolar have selected the below mentioned topic for research project to be submitted to Sri Devaraj Urs College of Nursing, Tamaka, Kolar as a fulfilment of Bachelor of Science in Nursing Degree.

Title: "A STUDY TO ASSESS THE EFFECTIVENESS OF STRUCTURED TEACHING PROGRAMME ON THE APPLICATIONS OF NANOTECHNOLOGY IN HEALTHCARE AMONG NURSING STUDENTS AT SELECTED NURSING COLLEGES,KOLAR,IN A VIEW TO DEVELOP INFORMATIONAL BOOKLET.

With regards to the above, we kindly request you to validate the content of structured tool for its appropriateness and relevancy. Thereby, we enclose our tool content for your reference. We remain thankful for you great help

Thanking You.

ANNEXURE-D

CRITERIA RATING SCALE FOR VALIDATING THE STRUCTURED KNOWLEDGE

Respected madam,

Kindly go through the content and place tick mark () against questionnaire in the following column ranging from very relevant to not relevant, when found to be not relevant and need modification kindly give your opinion in the remark column.

SL.NO	ITEM	VERY RELEVANT	RELEVANT	NEEDS MODIFICATION	NOT RELEVANT
1.	Objectives • Students realistic to achieve				
2.	Content selection • Reflect the objective • According to the students cognitive level • Aims at high level of the students				
3.	Organization of content • Logical • Sequence • Continuity • integration				
4.	Langue • simple • clean • understandable				

Structured knowledge questionnaire evaluation format on application of nanotechnology in healthcare among nursing students

Sl.NO	ITEM	VERY RELEVANT	RELEVANT	NEEDS MODIFICATION	NOT RELEVANT
I	SECTION-A DEMOGRAPHIC DATA				
1					
2					
3					
II	Knowledge questionnaire related to nanotechnology				
1					
2					
3					
4					
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20					
21					

Suggestions

.....
.....
.....

Date :

Place :

Signature of the expert

Name and designation

ANNEXURE-E

CONTENT VALIDITY CERTIFICATE

I hereby certify that I have validated the tool of Ms. Blessy Ms. Chaithra s Mr.Charan chandra Ms. Chinju m Ms.Merin martin Ms. Nandini m Ms.Neethu ks Ms.Nikhitha kp Ms. Nirmala chettri Ms.gayathri students of Sri Devaraj Urs College of Nursing, Tamaka, kolar who is undertaking research projct as a partial fulfilment of Bachelor of Science in Nursing Degree.

"**A STUDY TO ASSESS THE EFFECTIVENESS OF STRUCTURED TEACHING PROGRAMME ON THE APPLICATIONS OF NANOTECHNOLOGY IN HEALTHCARE AMONG NURSING STUDENTS AT SELECTED NURSING COLLEGES,KOLAR, IN A VIEW TO DEVELOP INFORMATIONAL BOOKLET.**"

Signature of the expert

ANNEXURE-F

CERTIFICATE FROM STATISTICIAN

I hereby that I have provided statistical guidance in analysis to Ms. Blessy Ms. Chaithra s Mr.Charan chandra Ms. Chinju m Ms.Merin martin Ms. Nandini m Ms.Neethu ks Ms.Nikhitha KP Ms. Nirmala chettri Ms.gayathri. IV year, Bsc (N) student of Sri Devaraj urs college of nursing Tamaka, kolar for their study titled

"**A STUDY TO ASSESS THE EFFECTIVENESS OF STRUCTURED TEACHING PROGRAMME ON THE APPLICATIONS OF NANOTECHNOLOGY IN HEALTHCARE AMONG NURSING STUDENTS AT SELECTED NURSING COLLEGES,KOLAR,IN A VIEW TO DEVELOP INFORMATIONAL BOOKLET.**"

Prof. Ravi Shankar (statistician)

Sri Devaraj urs deemed university

Tamaka, kolar-563101

Date:

Place: kolar

ANNEXURE-G

CONSENT LETTER

Dear participants,

We IV year B.sc Nursing students of Sri Devaraj Urs College of Nursing Tamaka,Kolar, conducting a research study on "**A study to assess the effectiveness of structured teaching Programme on the applications of nanotechnology in healthcare among nursing students at selected nursing colleges,kolar,in a view to develop informational booklet."**

You will be asked about your demographic information and information related to nanotechnology and would like you to be as a participant in my study .The study will not cause any harm to you. The information's given by you will be kept confidential and only used for the study purpose. Hope you will co-operate with me for the fulfillment of the research project.

Thankyou in advance for your co-operation.kindly sign the concent form given below.

Signature of the investigator

I have read the procedure described above and I voluntarily agree to participate in the research study.

Signature of the participant with date

ANEXURE-H

SECTION A: SOCIO DEMOGRAPHIC DATA

IDENTIFICATION DATA

1. Age in years

A.19-20years

B.21-22years

C.23-24years

2. Gender

A .Male

B. Female

3. Year of study

A.III year BSc (N)

B.IV year BSc (N)

4. Previous exposure to information on application of nanotechnology in healthcare

A. Yes

B. No

If yes, specify

A. Friends

B. Internet

C. Teachers

D. Any other

ANNEXURE-I

STRUCTURED KNOWLEDGE QUESTIONNAIRE

RELATED TO NANOTECHNOLOGY

General questions related to nanotechnology

1. The word "Nano" means

a. Extremely small

b. Small

c. Large

d. Extremely large

2. Nanotechnology deals with sizes from

a. 1-100mm range

b. 1-100cm range

c. 1-100nm range

d. 1-100dm range

3.The word "Nanotechnology' means

a. Manipulation of materials less than 100mm

b. Process of carrying drug to the desired site of action

c. Monitoring, repairing and construction of human biological system

d. Manipulation of materials less than 100nm

4. The purpose of nanotechnology in the medical field are

a. Testing and diagnosis

b. Tissue engineering

c. Drug delivery

d. All of the above

5. The application of nanotechnology in medicine is

a. Food safety

b. Regenerative medicine

c. Informational technology

d. Electronics

6. One of the useful tools against cancer is

a. Carbon nanotubes

b. Gold Nano shells

c. Copper nanotubes

d. Iron oxide nanoparticles

7. One of the following which is used in cancer therapeutics is

a. Carbon nanotubes

b. Nanorods

c. Nanobots

d. All of the above

8. Targeted drug delivery means:

a. Delivering a drug from the factory to the targeted population

b. Making more drug available to the affected population

c. Delivering a drug directly to the diseased part of the body

d. None of the above

9. The expansion of CNT is

a. Copper Nano Tube

b. Carbon Nano Tube

c. Cell Nano Tube

d. Crystal Nano Tube

10. The application of nanotube in health care is mainly for

a. Diagnostic purpose

b. Food safety

c. Delivery of drugs

d. None of the above

11.One of the following is an optical type of nanosensors

a. Proximity and ambient light

b. DNA interaction

c. Enzymatic interaction

d. All of the above

12. The metal used with nanoparticles for antibiotic delivery is

a. Gold

b. Titanium

c. Zinc

d. Silver

13. The device which could be used for manipulations of viruses and DNA strands is

a. Nanotweezers

b. Nano needles

c. Ferro fluids

d. Dendrimers

14. The expansion of UMDD is

a. Ultrasound-Medicated Drug Delivery

b. Ultrasound-Mediation Drug Delivery

c. Ultrasound-Medication Drug Delivery

d. Ultrasound-Mediated Drug Delivery

15. The one thing which has been proposed for the regeneration of functional tissue, to promote cell transplantation and to induce cell differentiation and repair is

a. Scaffolds

b. Nano tweezers

c. Nano needles

d. Nanotubes

16. The expansion of SPION is

a. Supraparamagnetic iron oxide nanoparticles

b. Superparamagnetic iron oxide nanoparticles

c. Superparamagnetic ion oxide nanoparticles

d. None of the above

17.One of the appropriate scans which can take images of the inside of joints, synovium or articular cartilage is

a. X-RAY

b. CT SCAN

c. Ultrasonography

d. Magnetic resonance imaging (MRI)

18. The combination of nanoparticles, gene therapy, and medical imaging has given rise to a new field known as

a. Gene theranostics

b. Molecular imaging

c. Nano oncology

d. Nanobioconjugation

19. The device which is used for guiding prostate biopsy is

a. Polymer nanoparticles

b. Silver nanoparticles

c. TRUS device

d. Zero nanoparticles

20. The following are the advantages of nanomedicine

a. Drug delivery to the exact location.

b. To reduce lesser side effects

c. Disease detection is relatively easy

d. All of the above

21. The knowledge on nanotechnology in nursing field is mainly required for

a. For molecular profiling and writing molecular based treatments

b. For administering new precision molecular drug therapy

c. To understand the drug metabolism and pharmacokinetics of nanomedicine

d. All of the above

ANNEXURE - J

ANSWRE KEY

Question no	answer
1	a
2	c
3	d
4	d
5	b
6	d
7	a
8	c
9	b
10	c
11	a
12	a
13	a
14	d
15	a
16	b
17	d
18	a
19	c
20	d
21	d

Dear Madam,

Kindly go through the tool content, give your opinion in the columns given in the criteria tables against to each questions. Please give your valuable suggestion.

Part A: DEMOGRAPHIC DATA

Sl ;no	Items	Very Relevant	Relevant	Needs modification	Not relevant	Remarks

Part-B: STRUCTURED KNOWLWDGE QUESTIONNAIRE

Sl.no	Items	Very relevant	relevant	Needs modification	Not relevant	remarks
1						
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General comments

……
……
……

Date: **signature of the expert**

Place:

ANNEXURE-K

LESSON PLAN

Name of the teacher	::	Ms. Nandini M
Topic	::	Nanotechnology in health care
Method of teaching	::	Lecture method
Date	::	21/7/22 and 29/7/22
Duration	::	45 minutes
Place	::	Class room of 4th year b.sc
Av aids	::	LCD
Previous knowledge of group	::	3rd and 4th year b.sc nursing students don't have any Previous

knowledge on nanotechnology

General objectives :: By the end of the session students of 3rd and 4th year b.sc nursing students will acquire in depth knowledge regarding Nanotechnology and its applications In healthcare

Specific objectives :: The students will be able to :-

- Define nanotechnology
- List Goals of nanotechnology
- Illustrate Purpose of nanotechnology
- Enumerate Applications of nanotechnology
- Explain nanotechnology in drug delivery
- Describe nanotechnology in regenerative medicine
- Explain nanotechnology in tissue engineering
- Describing nursing implications in nanotechnology

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Time limit	Specific objectives	content	Teachers activity	Learners activity	AV aids	Evaluation
2min			INTRODUCTION The word “Nano” is derived from the Greek word which means dwarf or extremely small. These are the solid particles with the size in the range of 10-1000nm. It is the field of applied science focused on the devices and materials on the nanoscales. nanotechnology is literally compasses the application and fabrication of physical, chemical, and biological systems at scales ranging from individual molecules to			

			atoms to submicron dimensions, and also the integration of these resulting nanomaterials into larger systems.it has the capacity to create new materials and devices with variety of applications such as energy production and medicine and electronics. **Announcement of the topic** "NANOTECHNOLOGY IN HEALTH CARE"			
Time limit	**Specific objectives**	**Content**	**Teachers activity**	**Learners activity**	**A V aids**	**Evaluation**
2min	Define nanotechnology.	**DEFINITION ;** Nanotechnology is the science of materials at the molecular or subatomic level. It involves manipulation of	The teacher explains the meaning of nanotechnology with the help of LCD.	The learners listen to it and	LCD	What is Nanotechnology?

		particles smaller then 100 nanometer and technology involves in developing materials or devices within that size in-visible to the human eye often many hundred times thinner than the width if human hair. **GOALS OF NANOTECHNOLOGY IN HEALTH CARE**	The teacher explains the goals of nanotechnology in health care	writes note.		
	List the goals of nanotechnology in heath care	By the help of nanotechnology, medical professionals hope to prevent the illness, more quickly diagnose, control disease and treat a disease in a effective way and with the fewer side effects and create better medical aids which can be helpful to treat the disease in an effective way and faster rate. Nanoparticles and surfaces made of		The learners listen and write the notes	LCD	List the goals of nanotechnology?

		nanostructures are used in many areas of healthcare researchers				
Time limit	Specific objectives	Content	Teachers activity	Learners activity	A V aids	Evaluation
	Illustrate the purpose of nanotechnology in heath care	**PURPOSES OF NANOTECHNOLOGY IN HEALTH CARE** With the use of nanotechnology, medical professionals hope to prevent illness, more quickly diagnose, control disease and treat disease with fewer slide effects, and create better medical aids which can be helpful to treat the disease in an effective way at a faster rate. Nanoparticles and surfaces made of nanostructures are used in many areas of health care researchers.	Illustrating the purposes of nanotechnology	Learners will listen and write the notes	LCD	Illustrate the purposes of nanotechnology in health care?

	Enlist the application of nanotechnology	**APPLICATIONS OF NANOTECHNOLOGY IN HEALTH CARE** **Applications of nanotechnology in medical field includes** • **d**rug delivery • surgery • cancer • regenerative medicine • cell repair • tissue engineering • medical instruments • drug discover • tissue replacement	Teacher enlists the applications of nanotechnology in health care	Learners listen and write down the notes	LCD	Enlist the applications of the nanotechnology in the health care?

Time limit	Specific objectives	Content	Teachers activity	Learners activity	A V aids	Evaluation
	Explain nanotechnology in medicine	NANOTECHNOLOGY IN MEDICINE a) nano oncology • cancer biomarkers are indicators produced by tumors cells spreading in the body and all and commonly in the cancer detection however the targeted delivery of specific nanoparticles into the tumor induced the local interaction with cancer cells and foresees them to significantly increases the production of biomarkers.	Teacher will Explain the nanotechnology in medicine	Learners listened and taking down the notes	LCD	What is nanotechnology in medicine?

		NANOMEDICINE FOR ACUURATE CANCER IMAGING • iron oxide nanoparticles are only useful tool against cancer because when nano-engineered with a specific coating, they bind particularly well to tumors • there magnetic properties make them suitable agents with MRI scans while there size and concentration in there tumor allow a very high resolution and an accurate				
Time limit	Specific objectives	Content	Teachers activity	Lernens activity	A V aids	Evaluation
		C. Nanomedicine for the eye • Colloidal system, both in liquid and solid form have excellent potential for interaction with the				

		eye due to their sizes and the characteristics of their surfaces, they are strongly taken up the cornea, forming a drug and enhancing efficacy in treating diseases of the anterior eye. ❖ **NANO VECTORS** An ideal injected therapeutic drug would travel through the vasculature, reach the intended target and full concentration ,and there act selectively on diseased cells and tissues only without creating undesired side effects. ❖ **OPTICAL NANO TWEERERS** These are the devices capable of trapping and manipulating objectives on the nanometer scale, even single molecule				

Time limit	Specific objectives	Content	Teachers activity	Learners activity	A V aids	Evaluations
	Explain the nanotechnology in drug delivery	**2. NANOTECHNOLOGY IN DRUG DELIVERY** Treatment that employs large size materials for drug delivery presents problems such as poor bioviability, low solubility, a lack of targeted delivery and generalized side effects. The application of nanotechnology of drug delivery provides the potential for enhanced treatments with targeted delivery delivery and fewer side effects	Teachers explains nanotechnology in drug delivery	Learners should listen and write the notes	LCD	What is nanotechnology in drug delivery?

		Applications of nanotechnology in drug delivery **1.** improve the ability to delivery drug that are poorly water soluble. 2. help the drug to retain in the body long enough for effective treatment 3.combine the therapeutic and diagnostic modalities into one agent				
Time limit	Specific objectives	Content	Teachers activity	Learners activity	A V aids	evaluation
		A. . TARGETED DRUG DELIVERY ☑ Targeted drug delivery is defined as the process of				

		carrying a drug to the desired site of action and releasing it at that site using local or peripheral control means TARGETED DRUG DELIVERY IS GIVEN BY ➲ GOLD NANOPARTICLES ➲ CARBON NANOTUBES ➲ ULTRASOUND-MEDIATED DRUG DELIVERY(UMDD)				
Time limit	Specific objectives	Contact	Teachers activity	Learners activity	A V aids	Evaluation
		3. NANOTECHNOLOGY IN TESTING AND DIAGNOSTICES Mainly is used to diagnose • CANCER				

	Explain nanotechnology in tissue eneineerig	For cancer, Nano devices are being investigated for the capture of blood bone biomarkers. Using TRUS DEVICES • ARTHRITES In vivo molecular imaging approaches like magnetic resonance imaging can take images of inside of joints **4.NANOTECHNOLOGY IN TISSUE ENGINEERING** It is the study of the growth of new tissues and organs, staring from the base of cells and scaffolds. The scaffolds are used are three dimensional structures in	Teacher explains tissue engineering in nanotechnology	Learners are listening and write the notes	LCD	Explain tissue engineering in nanotechnology ?

		which cells grow, proliferate and differnciate into various cell types. ☑ The advantages of nanoparticles in TE stems from their small size and their associated large surfaces to volume ratio.				
		☑ The use of right type of nanoparticles in TE can significantly enhance the biological mechanical and electrical properties of scaffolds and so on 4. GENE THERANOSTICS The combination of nanoparticles, gene therapy and medical imagining has given rise to a new feel known as gene theranostics				

		5. NANOPARTICLES USED IN GENE DELIVERY Polymer nanoparticles deliver genes or therapeutic protein including drugs which can either be dissolved or encapsulated within them forming a nanoparticle and nano capsule respectively.				
Time limit	Specific objectives	CONTENT	Teachers activity	Learners Activity	A,V, AIDS	Evaluvation
	Describe the nursing implications in nanotechnology	NURSING IMPLICATIONS ➢ Nanotechnology will have substantial implications for nursing informatics. These implications would involve the	Teacher describes the nanotechnology in health care	Learners listens and write down the notes	LCD	Describe the nursing implication in nanotechnology in health care?

		electronic health record design, systems interoperability and safety controls. ➢ Nurses are in a prime position to influence and advocate for safe and ethical use of Nanotechnologies in the workplace. ➢ Nurses will need to create care plans to assist patients in their more independent role. ➢ Nurses need to be educated on occupational safety guidelines regarding safe handling of nanomaterial in the workplace. ➢ The nurse will need to understand the drug metabolism and pharmacokinetics of nanomedicines in order to achieve appropriate therapeutic				

		dosing. ➢ Nurses in some oncology practices could potentially be responsible for recommending molecular profiling and writing molecular-based treatment regimens. ➢ It's important for nurses to become familiar with the concept of targeted drug therapies so that they can communicate with their patients about these new treatments so that the patients can then make informed treatment decisions.				