



Research Article

A PRE - POST KNOWLEDGE COMPARISON OF STUDENTS BEFORE & AFTER EXPOSURE TO A MODULE ON 'APPLICATIONS OF NANOTECHNOLOGY IN DENTISTRY' AT A DENTAL COLLEGE IN KERALA

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ABSTRACT

Introduction: Nanotechnology is a field of applied science which deals with the control of matter on the molecular level in scales smaller than 1µm. Dentistry is not exempt from this revolutionary technical advance in science.

Aim: The aim of this Pre-post knowledge assessment was to evaluate change in awareness on applications of nanotechnology in dentistry of Final BDS students at a Dental College after exposure to a module in applications of nanotechnology in dentistry.

Materials and Method: A questionnaire with 10 closed-ended questions on nanotechnology and five open-ended questions on demographics was devised and distributed. After initial assessment, an intervention in the form of a 1hour module on nanotechnology and its applications in Dentistry were presented. Following the presentation, post knowledge assessment forms were distributed and the completed forms collected. The data obtained was students converted and entered into excel sheets and statistical analysis done.

Result: The mean pre and post test score of 30 student's was 3.27 and 8.6 respectively.

Conclusion: This study revealed that there was lack of awareness on applications of Nanotechnology in dentistry among the Final BDS students at a Dental College as evidenced by the pre-test scores. In the post knowledge assessment, there was a definite improvement in knowledge of the applications of nanotechnology in dentistry. Therefore, this study is just one step in the direction to emphasize on the need of realizing importance of imparting knowledge about applications of nanotechnology in dentistry.

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INTRODUCTION

Nanotechnology is a field of applied science which deals with the control of matter on the molecular level in scales smaller than 1µm. Richard P Feynman in 1959 introduced the concept of nanotechnology, the fundamental idea of which was employing machines to make even smaller machine tools until we reach the nano or atomic level.[1,2]Dentistry has also benefitted from this revolutionary technical advance in science. A variety of new dental products that rely on nanotechnology are available, ranging from implants to oral hygiene products.[3] It promotes minimally invasive dentistry, creating a more patient friendly atmosphere.

One hardly comes across the concepts of nanotechnology or nano-dentistry in the dental curriculum. A need was felt to carry out a research survey in order to measure the basic knowledge and practical applications of nanotechnology in the field of dentistry among dental students.

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This was the rationale behind this pre-post knowledge assessment research to evaluate Knowledge and applications of Nanotechnology in Dentistry before and after exposure to a module in nanotechnology in dentistry among Under Graduates Students at a Dental College in Kerala.

Aim

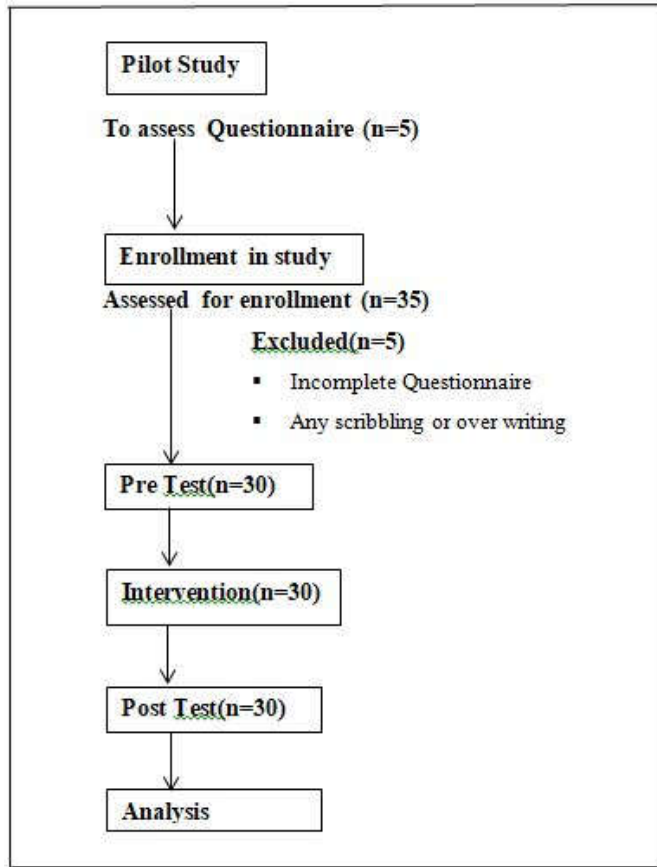
This Pre- post knowledge assessment aims at evaluating change in awareness on applications of nanotechnology in dentistry of Final BDS students at a Dental College in Kerala after exposure to a module in application of nanotechnology in dentistry.

Objectives

1. To evaluate the basic awareness on nanotechnology in dentistry of Final BDS students at a Dental College in Kerala.
2. To compare Pre-test and post-test knowledge assessment values on awareness on applications of nanotechnology in dentistry of Final BDS students at a Dental College in Kerala.

MATERIALS AND METHODS

A self-administered questionnaire with 10 closed-ended questions on nanotechnology and five open ended questions on demographics was devised and distributed. Pilot study on 5 students was done to assess validity of the questionnaire. The final questionnaire contained **15 items**. The tool exhibited adequate reliability and construct validity.



This study was a questionnaire based pre-post study. In this study, questions on nanotechnology and its applications in dentistry starting from basic knowledge to some of the latest advancements were included. A structured questionnaire with 10 closed-ended questions on nanotechnology and its applications in dentistry and five open-ended questions on demographics was devised and distributed. The questionnaire was designed to assess basic understanding of nanotechnology among the under graduate students of dentistry. Response choices were provided.

Domains Included in Preparation of the Questionnaire

Included

- Demographic details-5
- Concept and Applications of Nanotechnology -10

Total of 35 questionnaires were distributed. After initial assessment, an intervention in the form of a one hour module presentation (Lecture with Powerpoint) on the concept and applications of nanotechnology in dentistry was presented. Following the presentation, a post knowledge assessment form was distributed and collected. The average time taken for pre-post knowledge assessment was 10 minutes each.

A convenience sampling technique was followed by including all the Final year BDS students of a Dental College. Data collection was performed after obtaining informed consent from the participants and permission from the authorities.

Inclusion criteria

Questionnaires were provided only to those students who accepted to be part of this study.

Exclusion criteria

1. Incomplete questionnaire
2. Any scribbling or over writing
3. First, second and third year BDS students

A Total of 35 pre and post questionnaires were distributed by the researcher of which only 30 participants responded with a complete pre and post questionnaire..

RESULTS

The data obtained was numerically converted and entered in Microsoft Excel. Statistical Analysis was done with SPSS software (Version 16- SPSS Statistics for Windows, Armonk, NY: IBM Corp.). Descriptive statistics was used to report frequency and percentage. Almost half of the participants were having some awareness on Nano technology. The differences between the pre- and post-test results were determined and subjected to paired *t*-test. A 'p'-value of less than 0.05 was considered statistically significant.

DISCUSSION

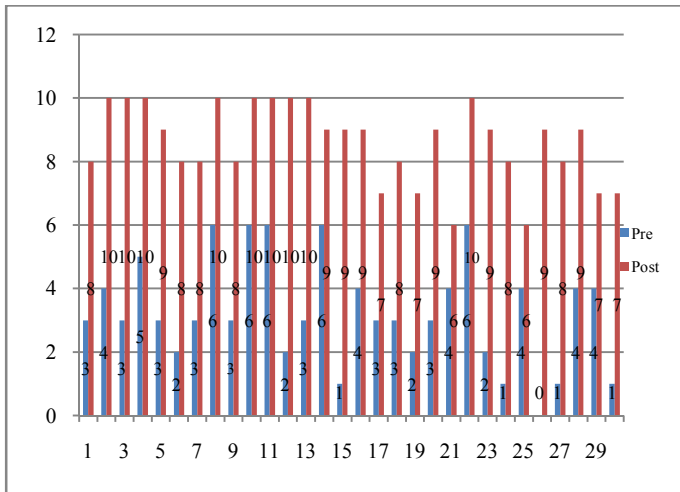
Nanotechnology is a new revolution in the field of dentistry that can bring considerable improvement to human health in the form of nanomaterials, nano diagnostics and nano robotics.[3] Nano dentistry will make possible the maintenance of comprehensive oral health by employing nano tissue devices which will allow dentine replacement therapy, precisely controlled oral analgesia, permanent hypersensitivity cure and complete orthodontic realignment etc., all in single office visit. However, though nanotechnology possesses tremendous potential, like two sides of a coin, it has its share of limitations including social issues of public acceptance, ethics, regulation and human safety.[4,5]

Given that nanotechnology is one of the most popular emerging sciences, it has a very promising future. A lot of research is taking place around the globe in this area. Abiodun-Solanke *et al* [6] in their study concluded that Nanotechnology would change health care in a fundamental way. It forms the basis for novel methods for disease diagnosis and prevention. It will be useful in the selection of therapeutic procedures tailored for the patient's profile. This will also come in handy in drug delivery and gene therapy. However, very little knowledge and understanding exists in this connection amongst the students of dentistry reviewed in this study.

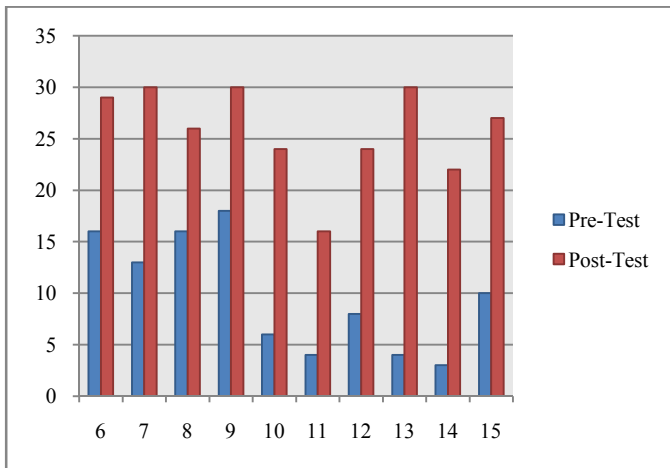
Kathleen M. Rose [7] concluded that overall survey respondents were unfamiliar with nanotechnology and personally viewed it not so important. According to her survey, respondents' attitudes toward nanotechnology were relatively ambiguous, with similar views of both risks and benefits. Despite the ambiguity, participants generally supported regulations for the use of nanotechnology and expressed interest in learning more about this new technology.

In the present study, *Question Numbers 6 to 15* were used for scoring. Structured response format was used and the answers comprised of wrong choices versus correct choices, which were scored as 0 and 1 respectively. The Scores were converted to percentage.

- ✓ The mean pre-test score of 30 students was 3.27.
- ✓ The mean post-test score of 30 students was 8.6.
- ✓ The highest score obtained in the Pre-test was 6 and the lowest score was 0.
- ✓ 9 students obtained all correct answers in the Post-test Questionnaire. The lowest Post-test score was 6. (Graph 1)
- ✓ In terms of difficulty, *question no.11* was the most difficult with an average pre-test score of 4 (13.33%) and post-test score of 16. (Graph 2)
- ✓ In the pre-test, *question no 9* had the maximum correct answers at 60%.
- ✓ In the post-test, *question no's 7, 9 and 13* had 100% correct answers from the 30 students.



Graph 1 Graph showing pre and post knowledge assessment scores of individual students



Graph 2 Graph showing the pre and post responses for each item

Table 1 Pre and Post Test Statistics

	N	Mean	StdDev	Std Error Mean
Pre Test	30	3.2667	1.68018	.30676
Post Test	30	8.6000	1.24845	.22793

- ✓ The mean pre test score of 30 students- 3.27
- ✓ The mean post test score of 30 students- 8.6
- ✓ The mean difference obtained was significant at $p < .05$

Table 2 Maximum correct responses

Question No	Pre Test (%)	Question No	Post Test (%)
9	60	7	100
8	53.33	9	100
6	53.23	13	100
7	43.33	6	96.67
15	33.33	15	90

Table 3 Question-wise Pre and Post Responses

No	Item	Pre	Post
6	The prefix "nano" comes from a ... Richard Feynman is often credited with predicting the potential of nanotechnology. What was the title of his famous speech given on December 29, 1959?	16	29
7	Nanorobots (nanobots)...	16	26
8	The 'bottom-up' approach refers to	18	30
9	Applications of nanotechnology in Prosthodontics include all except	06	24
10	Applications of nanotechnology in Conservative Dentistry & Endodontics include all except	04	16
11	Applications of nanotechnology in Oral Surgery include all except	08	24
12	Nanodentistry includes all except	04	30
13	Dental hypersensitivity is controlled with	03	22
14	Applications of nanotechnology in Orthodontics include all except	10	27
15			

The participants in this survey revealed that they were having some awareness of nano technology as a science; but they were not that aware about its applications in dentistry. In the post knowledge assessment, there was a definite improvement in knowledge of the applications of nanotechnology in dentistry. As an encouraging sign, almost all participants agreed upon the need of nano technology to be introduced as a subject in the curriculum of dentistry.

CONCLUSION

This study revealed that there was lack of awareness on the applications of Nanotechnology in dentistry among the Final BDS students at a Dental College in Kerala. Nevertheless, despite lack of awareness on applications of nanotechnology in dentistry among the dental students, there was a great amount of enthusiasm in learning nano technology and its applications in dentistry since there was a statistically significant improvement in the post-knowledge assessment of the applications of nanotechnology in dentistry. Furthermore, majority of the participants recommended its inclusion as part of the curriculum in dentistry. Therefore, this study is just one step in the direction to emphasize on the need of realizing importance of exposure to knowledge of applications of nanotechnology in the field of dentistry.

Conflict of Interest

The authors declare that there were no conflicts of interest in the present study. There was no sponsorship of any kind from any organization.

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