SCIENTIFIC ARCHIVES OF DENTAL SCIENCES (ISSN: 2642-1623)

Volume 7 Issue 8 August 2024

Research Article

Knowledge, Attitude and Practices about Anaemia and Malnutrition among Dental Students of a Dental College in Bangalore City: A Cross-Sectional Study

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Received: September 11, 2024; **Published:** October 14, 2024

Abstract

Objective: This study evaluates the effectiveness of a nutritional training program on dental students' knowledge, attitudes, and practices regarding anemia and malnutrition.

Methods: A cohort of 81 dental students participated in the training program, which aimed to enhance their understanding of malnutrition and anemia. Pre- and post-training assessments were conducted to measure changes in knowledge, perceptions, and practical applications. Statistical analyses were performed to determine the significance of observed changes.

Results: The training significantly improved participants' ability to identify malnutrition in children ($P < 0.0005$), familiarity with nutritional assessment methods ($P < 0.001$), and awareness of national health programs ($P < 0.001$). Understanding of the preventability of iron deficiency anemia also improved ($P < 0.001$). Participants' perceptions of the multifactorial nature of malnutrition and the need for a balanced diet across all age groups increased significantly ($P < 0.001$). However, the program had a minimal impact on understanding of balanced diets ($P = 0.375$) and showed mixed results regarding practical applications, such as diet counseling ($P < 0.001$) and assessing nutritional status ($P = 0.152$).

Conclusion: The nutritional training program successfully enhanced dental students' knowledge and awareness of key nutritional concepts and national health programs. While improvements in some practices were observed, further efforts are needed to translate knowledge into routine clinical practice. Future programs should focus on practical applications and overcoming barriers to effective implementation.

Keywords: *Nutritional Training; Dental Students; Anemia; Malnutrition; Knowledge Improvement; Dietary Practices*

Introduction

Malnutrition can be defined as a lack of proper nutrition. The nutritional status of a child, as with any individual, is assessed through dietary, anthropometric, biochemical and physical observation for signs of malnutrition. These methods of measurement are usually done in combination for more accurate results. When there is a deficiency in the amount and nutritional value of the food consumed, the growth pattern of a child becomes disrupted owing to nutrient deficiencies [1]. India's latest National Family Health Survey (NFHS), which shows that children in several states are more undernourished now than they were five years ago, is based on data collected in 2019-20. The survey was conducted in only 22

states before the onset of the pandemic - so experts fear the results will be much worse in the remaining states, where the survey began after the lockdown ended [2]. 14 per cent of India's population is undernourished, according to 'The State of Food Security and Nutrition in the World, 2020' report. The report states 189.2 million people are undernourished in India and 34.7 per cent of the children aged under five in India are stunted. It further reports that 20 per cent of India's children under the age of 5 suffer from wasting, meaning their weight is too low for their height. The data certainly shows that malnutrition is indeed one of the most underrated problems faced by the country. Over the course of time, various governments have initiated several large scale supplementary feeding programmes aimed at overcoming specific deficiency diseases to combat malnutrition. This includes programmes such as the distribution of prophylaxis against nutritional anaemia, Special Nutrition Programme, Balwadi Nutrition Programme, ICDS programme, and Mid-day meal programmes. Even though most of these programmes which are aimed at children, lactating mothers, pregnant women, and women in reproductive age groups have brought in results.

Materials and Methods

Ethical clearance

The study proposal was submitted for approval and clearance was obtained from the ethical review board of Bangalore Institute of Dental Sciences.

Study design

This is an observational cross-sectional survey on the knowledge, attitude and practices about anaemia and malnutrition among dental students of a dental college in Bangalore city

Duration

The study was conducted between 27-30th May 2022.

Source of data

Data was collected from dental students in the form of google forms.

Results

Question Number 2: Do you know how to tell if a child is developing malnutrition?

Before the training, 46 participants knew how to identify malnutrition in children, while 27 did not. After the training, the number of participants who knew how to identify malnutrition increased to 50, with only 4 still unsure. The significant increase ($P < 0.0005$) indicates that the training program was highly effective in improving participants' ability to recognize signs of malnutrition in children.

	After			
Before	Yes	No	Total	P<0.0005[a]
Yes	46	4	50	
No	27	4	31	
Total	73	8	81	
a-Mcnemar Test.				

Table 1

Q3: Do you know and understand what is a balanced diet?

The majority of participants understood what constitutes a balanced diet both before (76) and after the training (77). The slight increase in correct responses was not statistically significant ($P = 0.375$), suggesting that the training did not notably affect participants' pre-existing knowledge about balanced diets.

	After			
Before	Yes	No	Total	P=0.375[a]
Yes	76	1	77	
No	4	0	4	
Total	80	1	81	
a-Mcnemar Test.				

Table 2

Q4: Do you know the different methods to assess nutritional status of an individual?

Before the training, 32 participants were aware of various methods to assess nutritional status, while 46 were not. After training, the number of participants who knew these methods increased to 34, with only 1 remaining unaware. The significant improvement ($P < 0.001$) shows that the training effectively enhanced participants' knowledge about nutritional assessment methods.

Q5: Do you know about the National Health Programmes addressing nutrition and anemia?

Initially, 32 participants were familiar with National Health Programmes related to nutrition and anemia, whereas 46 were not. Post-training, the number of participants knowledgeable about

	After			
Before	Yes	No	Total	P<0.001[a]
Yes	32	2	34	
No	46	1	47	
Total	78	3	81	
a-Mcnemar Test.				

Table 3

these programs increased to 34, with only 1 remaining uninformed. The significant change (P < 0.001) indicates the training program was effective in raising awareness about national health initiatives.

Q6: Malnutrition is multifactorial?

Before the training, 18 participants agreed and 9 strongly agreed that malnutrition is multifactorial. After training, these numbers increased to 38 and 16, respectively. The significant increase (P < 0.001) suggests that the training successfully enhanced understanding of the complex nature of malnutrition.

	After			
Before	Yes	No	Total	P<0.001[a]
Yes	32	2	34	
No	46	1	47	
Total	78	3	81	
a-Mcnemar Test.				

Table 4

Q7: Iron deficiency anemia can be easily prevented if necessary precautions are taken before?

Initially, 30 participants agreed and 8 strongly agreed that iron deficiency anemia can be prevented with precautions. After training, 35 agreed and 8 strongly agreed. The significant improvement (P < 0.001) indicates that the training enhanced participants' beliefs about the preventability of iron deficiency anemia.

	After			
Before	Agree	Strongly agree	Total	P<0.001[a]
Agree	18	38	56	
Strongly agree	9	16	25	
Total	27	54	81	
a-Mcnemar Test.				

Table 5

	After			
Before	Agree	Strongly agree	Total	P<0.001[a]
Agree	30	35	65	
Strongly agree	8	8	16	
Total	38	43	81	
a-Mcnemar Test.				

Table 6

Q8: Pregnant woman and children under five are not the only people who need a well-balanced diet before

Before training, 23 participants agreed and 9 strongly agreed that a well-balanced diet is needed by more than just pregnant women and young children. Post-training, these numbers rose to 29 and 20. The significant change (P < 0.001) reflects increased awareness of the need for a balanced diet across various age groups.

	After			
Before	Agree	Strongly agree	Total	P<0.001[a]
Agree	23	29	52	
Strongly agree	9	20	29	
Total	32	49	81	
a-Mcnemar Test.				

Table 7

Q9: We need more information to prevent anemia and malnutrition

31 participants agreed and 11 strongly agreed before the training that more information is needed to prevent anemia and malnutrition. After the training, 26 agreed and 14 strongly agreed. The statistically significant result (P < 0.020) indicates an increased recognition of the need for further information on these issues post-training.

	After			
Before	Agree	Strongly agree	Total	P<0.020[a]
Agree	31	26	56	
Strongly agree	11	14	25	
Total	41	40	81	
a-Mcnemar Test.				

Table 8

Q10: As dentists we can contribute towards diagnosing and counseling patients about malnutrition?

Initially, 23 participants agreed and 8 strongly agreed that dentists can contribute to diagnosing and counseling about malnutrition. After training, the number who agreed rose to 31, and those who strongly agreed increased to 19. The significant improvement ($P < 0.001$) indicates that the training enhanced participants' perception of the role dentists can play in addressing malnutrition.

	After			
Before	Agree	Strongly agree	Total	P<0.001[a]
Agree	23	31	54	
Strongly agree	08	19	27	
Total	31	50	81	
a-Mcnemar Test.				

Table 9

Q11: Do you assess the nutritional status of your patients?

The number of participants who assessed their patients' nutritional status increased from 53 to 61 after training. However, this change was not statistically significant ($P = 0.152$), suggesting that the training had limited impact on changing this specific practice.

	After			
Before	Yes	No	Total	P=0.152[a]
Yes	53	8	61	
No	16	4	20	
Total	69	12	81	
a-Mcnemar Test.				

Table 10

Q12: Are you willing to be trained to assess the nutritional status of your patients?

The willingness to receive training for assessing nutritional status was high both before and after the training, with no significant change ($P = 1$). This indicates that participants were already motivated to undergo further training, and the program did not notably alter this willingness.

	After			
Before	Yes	No	Total	P=1[a]
Yes	79	0	79	
No	1	1	2	
Total	80	1	81	
a-Mcnemar Test.				

Table 11

Q13: Do you do diet counseling in everyday practice

Before the training, 29 participants engaged in diet counseling, while 37 did not. After training, 37 participants provided diet counseling, with 44 not doing so. The significant change ($P < 0.001$) indicates that the training had a notable impact on increasing the practice of diet counseling among participants.

Q14: The intention to participate in National Health Programs by promoting and motivating others remained consistent before and after the training. The lack of significant change ($P = 0.601$) suggests that the training did not influence participants' commitment to this aspect.

	After			
Before	Yes	No	Total	P<0.001
Yes	29	8	37	
No	37	7	44	
Total	66	15	81	

Table 12

Q15: Will you be part of National Health Program by promoting and motivating people around you?

Before the training, 77 participants felt they could make a difference in nutritional status, with 3 not believing they could. After training, this number slightly increased to 77 yes responses, with 4 no responses. The change was not statistically significant ($P = 0.20$), indicating that the training had a limited effect on altering participants' beliefs about their impact on nutritional status.

	After			
Before	Yes	No	Total	P=0.601
Yes	77	1	77	
No	3	0	3	
Total	80	1	81	

Table 13

The nutritional training program demonstrated notable effectiveness in increasing knowledge and awareness related to various aspects of nutrition, such as recognizing malnutrition, understanding nutritional assessment methods, and the role of national health programs. Significant improvements were observed in participants' perceptions of malnutrition's complexity and the effectiveness of prevention measures for iron deficiency anemia. However, the training had a more modest impact on changing certain practices and beliefs, such as routine diet counseling and willingness to engage in national health programs. Overall, the training was successful in enhancing participants' understanding and attitudes towards nutrition, although some areas showed limited change.

	After			
Before	Yes	No	Total	P=0.20
Yes	77	0	77	
No	3	1	4	
Total	80	1	81	

Table 14

Discussion

The study aimed to evaluate the effectiveness of a nutritional training program in enhancing participants' knowledge and practices concerning nutrition, malnutrition, and anemia. The results reflect a generally positive impact of the training, although the extent of improvement varied across different areas. This discussion elaborates on these findings, their implications, and considerations for future initiatives.

Knowledge improvement

Identification of malnutrition in children: The training program led to a significant increase in participants' ability to identify malnutrition in children ($P < 0.0005$). Before the training, 46 participants could identify malnutrition, while 27 could not. Post-training, 50 participants demonstrated this knowledge, and only 4 remained unsure. This substantial improvement highlights the effectiveness of the training in enhancing critical skills needed for early intervention. Identifying malnutrition at an early stage is crucial for timely treatment and preventing severe health consequences, which underscores the importance of such educational programs. A systemic review by Sunguya., *et al*. [3] and studies done by Awuuh., *et al*. [4] yields similar results.

Understanding methods for assessing nutritional status: A notable increase was observed in participants' familiarity with methods for assessing nutritional status ($P < 0.001$). Initially, 32 participants knew how to assess nutritional status, compared to 46 who did not. After the training, the number of knowledgeable participants increased to 34, with only 1 remaining unaware. This improvement reflects the program's success in imparting practical knowledge essential for accurate nutritional assessments, which is critical for effective patient care and intervention. Similar results were seen in studies done by Getty and Thiagarajah [5], Epps., *et al*. [6].

Awareness of national health programs: The training also significantly improved participants' awareness of National Health Programmes addressing nutrition and anemia ($P < 0.001$). The increase from 32 participants aware of these programs before training to 34 after indicates a successful enhancement of participants' understanding of available resources. Awareness of such programs is vital for integrating national guidelines and resources into local practice, potentially improving overall community health outcomes [7].

Understanding of nutritional concepts

Balanced diet: The training did not significantly change participants' understanding of what constitutes a balanced diet ($P = 0.375$). Before the training, 76 participants understood the concept, which slightly increased to 77 after the training. This lack of significant change suggests that participants likely already had a solid grasp of balanced diets, or the training content may not have sufficiently addressed this topic to effect a noticeable change. The concept of a balanced diet is fundamental and may require more targeted or advanced educational strategies to foster deeper understanding. Similar studies have been done by Bhargava and Mishra [8]; Yajnik and Deshmukh [9] with similar results.

Preventability of iron deficiency anemia: Participants' understanding of the preventability of iron deficiency anemia improved significantly ($P < 0.001$). Initially, 30 participants agreed and 8 strongly agreed that iron deficiency anemia can be prevented with appropriate precautions. Post-training, agreement increased to 35, with 8 strongly agreeing. This suggests that the training effectively reinforced the importance of preventative measures, a key aspect in reducing the prevalence of anemia through proactive health strategies. Rajalakshmy., *et al*. [10] found similar results in their study.

Perceptions and practices

Multifactorial nature of malnutrition: The training effectively enhanced participants' perceptions of the multifactorial nature of malnutrition ($P < 0.001$). Before the training, 18 participants agreed and 9 strongly agreed that malnutrition is influenced by multiple factors. Post-training, agreement rose to 38, with 16 strongly agreeing. This shift reflects a deeper understanding of the complex etiology of malnutrition, which is crucial for developing comprehensive intervention strategies that address various contributing factors. A similar study conducted among physicians yielded similar results [11].

Need for a balanced diet across all age groups: Participants' awareness that a well- balanced diet is essential for more than just specific groups, such as pregnant women and young children, also improved significantly ($P < 0.001$). This change from 23 agreeing and 9 strongly agreeing before training to 29 agreeing and 20 strongly agreeing after training underscores an expanded understanding of nutritional needs across different age groups. Haskins and Neumark-Sztainer [12] found similar results in their study.

Need for more information: There was a significant recognition of the need for more information to prevent anemia and malnutrition ($P < 0.020$). Before training, 31 participants agreed and 11 strongly agreed on this need, which shifted slightly to 26 agreeing and 14 strongly agreeing after training. This result indicates that while the training increased awareness of information gaps, further efforts may be needed to fully address these needs and provide comprehensive educational resources. Kim and Choue [13] elicited similar results.

Impact on practices

Diet counselling: The training program had a significant impact on increasing the practice of diet counselling ($P < 0.001$). The number of participants engaging in diet counseling rose from 29 to 37. This suggests that the training successfully encouraged participants to incorporate diet counselling into their routines, which is important for improving patient outcomes through personalized dietary advice. Pendergast and Speiser [14] also emphasised on the need to train professionals on the importance of diet counselling.

Assessment of nutritional status: Although there was an increase in the number of participants assessing nutritional status from 53 to 61, this change was not statistically significant ($P = 0.152$). This indicates that while awareness of nutritional assessment methods improved, translating this knowledge into regular practice may be challenging. Additional strategies or support mechanisms might be necessary to facilitate the adoption of these practices in daily clinical settings. Shephard [15] found similar results in their study.

Participation in national health programs: The intention to participate in National Health Programs remained unchanged ($P = 0.601$). Both before and after training, 77 participants expressed willingness to promote and motivate others within these programs. This lack of change suggests that participants' commitment to broader initiatives was already high and may not have been significantly influenced by the training. Haskins and Neumark-Sztainer [12] has found results similar to the present study.

Belief in making a difference: Participants' belief in their ability to make a difference in the nutritional status of people around them remained stable ($P = 0.20$). The number of participants believing in their potential impact was consistently high, indicating that while the training may have reinforced this belief, it did not significantly alter it [11].

Limitations and Future Directions

The study has some limitations, including a relatively small sample size of 81 participants, which may limit the generalizability of the findings. The sample size was limited to dental students, which may affect the generalizability of the results to other healthcare professionals or broader populations. The training duration and

content may not have been sufficient to impact all areas equally. Future programs may need to be more comprehensive and tailored to address specific gaps.

Additionally, while statistical significance was achieved in several areas, the practical impact of these changes on real-world practices remains uncertain. Future studies should consider larger sample sizes and longitudinal follow-ups to better assess the long-term effects of training.

To enhance the impact of future nutritional training programs, it may be beneficial to incorporate more interactive and practical components, such as case studies and hands-on workshops. Understanding and addressing barriers to implementing new practices could also help in bridging the gap between knowledge acquisition and practical application [16,17].

Conclusion

The nutritional training program successfully increased knowledge and awareness in several key areas related to nutrition, malnutrition, and anemia. Significant improvements were observed in participants' understanding of identifying malnutrition, nutritional assessment methods, and the role of national health programs. However, the training's effect on changing specific practices and broader commitments was more modest. To maximize the effectiveness of such programs, future initiatives should focus on enhancing the translation of knowledge into practical application and addressing barriers to implementing new practices.

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