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INSTRUCTIVE INTERVENTION ON APPROACHES TO REDUCE CARBON FOOTPRINT IN DIALYSIS CENTRE

Healthcare

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ABSTRACT

India is the world's third-largest producer of Greenhouse Gases (GHGs). It emitted 2.7 billion metric tons of carbon dioxide equivalent in 2021, which constitutes 7% of the global total. Despite around 175,000 individuals undergoing renal dialysis in the country, many Healthcare Professionals (HPs) may not fully recognize the environmental impact of hemodialysis. This study aimed to evaluate and enhance HPs' knowledge about reducing the carbon footprint of dialysis Centre. A total of 32 HPs from the Dialysis Centre at Baba Hospital in Lucknow, UP, were selected using a convenient sampling method. The study employed a quantitative pre-experimental "one group pre-test and post-test" design. HPs' knowledge was assessed through structured questionnaires (pre-test), followed by a Instructive Intervention (II). After 7 days, the same questionnaires were administered (post-test) to measure knowledge improvement. Result showed that, most HPs were aged 31-40 years, with 59.37% male and 40.63% female. The majority were nursing officers (81.25%). The pre-test showed that 53.13% had inadequate knowledge, while none had adequate knowledge. In the post-test, 34.37% had moderately adequate knowledge, and 65.63% demonstrated adequate knowledge. The mean score difference between the pre-test and post-test was 14.84, with a t-value of 18.05, statistically significant at $P<0.05$. So, this study indicates a significant increase in HPs' knowledge regarding approaches to reduce carbon footprint in dialysis centre following the instructive intervention, emphasizing the need for awareness of eco-friendly dialysis practices or green Nephrology.

KEYWORDS

Greenhouse Gases, Carbon Footprint, Dialysis Centre, Green Nephrology

INTRODUCTION

High-technology medicine saves lives but also generates waste, as seen with dialysis. The growing volume of waste products poses various biological risks. Some of these waste materials can directly infect or harm other living organisms such as potentially contaminated or hazardous waste, while others threaten the environment, including plastic and non-recycled waste [1]. Greenhouse gases (GHGs) are gases present in the earth's atmosphere that trap heat. Some of the natural GHGs are Carbon dioxide, Methane, Nitrous oxide. Some of the man-made GHGs are also play important roles like hydrofluorocarbons, perfluorocarbons and sulphur hexafluoride [2]. A carbon footprint is the total amount of greenhouse gases that are generated by industries. Health care is contributing an estimated 4%–6% of global greenhouse gas emissions [3].

India has become the world's third-largest producer of greenhouse gases. In 2021, it emitted 2.7 billion metric tons of carbon dioxide equivalent which accounts for 7% of the global total [4]. Around 175,000 individuals receive renal dialysis, with 129 cases per million people in India [5]. As per Sehgal et al. (2022), on average, each Dialysis Centre emitted 769,374 kg CO2-equivalent (with a 95% confidence interval of 709,388 to 848,180 kg CO2-eq). The three largest sources of total emissions were transportation of patients and staff (28.3%), electricity usage (27.4%), and natural gas consumption (15.2%). Emissions per treatment averaged 58.9 kg CO2-eq, although there was a three-fold variation among different facilities[6].

It is crucial for Health Professionals (HPs) to not only recognize and treat kidney disease but also deeply understand the relationship between renal dialysis and their associated carbon footprints [7]. This understanding includes how various approaches like Reduce the need for dialysis by using strategies to delay it when possible and by using flexible schedules, Limit medications and focus on lifestyle and diet changes, Encourage the reuse of hospital supplies when appropriate, Recycle paper and glass, Recycle clean plastic, Use less water, Use less energy, Include environmental impact criteria when evaluating dialysis machines and supplies, Advocate for eco-friendly practices in the construction of new facilities can reduce carbon footprint in dialysis centre [1].

Educating HPs on various approaches to reduce carbon footprint in dialysis centre can lead to big contribution to reduction in the overall carbon emissions associated with healthcare services. By emphasizing the significance of low-carbon treatments and preventive measures, health professionals can play a pivotal role in promoting both individual health and environmental sustainability, ultimately leading to a more effective and responsible healthcare system. However, many Healthcare Professionals may not be aware of the enormous environmental impact of haemodialysis, and there are opportunities for improvement. In this study, we assessed the knowledge level of HPs and educated them about various approaches to reduce the carbon footprint of a dialysis unit.

METHODS

A sample of 32 HPs employed at the Dialysis Centre of Baba Hospital in Lucknow, Uttar Pradesh, India, was selected using a convenient sampling method. The study utilized a quantitative pre-experimental research design, specifically a "one group pre and post-test design," to evaluate the effectiveness of an Instructive Intervention. Initially, the research began with a comprehensive assessment of the HPs' knowledge regarding various approaches to reduce their carbon footprint.

This assessment was conducted using structured questionnaires designed to gauge their understanding of environmental sustainability practices relevant to their work environment. Following the initial assessment (pre-test), a Instructive Intervention was implemented. This program was meticulously designed to educate the HPs on several key topics, including strategies for saving water and energy, as well as the importance of recycling uncontaminated materials in the healthcare setting. The educational sessions were interactive and aimed at enhancing the participants' knowledge and application of these eco-friendly practices. After a period of 7 days, which allowed the HPs to reflect on and absorb the information presented during the Instructive Intervention, the same structured questionnaires were re-administered to the participants as a post-test.

This post-test aimed to measure any changes in knowledge and understanding that had occurred as a result of the intervention. The data collected from both the pre-test and post-test questionnaires were thoroughly analyzed to determine the effectiveness of the teaching program.

RESULTS

Demographic Variables Of Subjects

Table-1

Sl. No.	Variables	Frequency (N=32)	%
1.	Age		

	21-30 Years	3	9.38
	31-40 Years	17	53.12
	Above 40 Years	12	37.5
2.	Gender		
	Male	19	59.38
	Female	13	40.62
3.	Professional Qualification		
	Diploma in Nursing	10	31.25
	Graduate in Nursing	15	46.88
	Post graduate Nursing	1	3.12
	Diploma in Dialysis Technician	6	18.75
4.	Designation		
	Nursing Officer	26	81.25
	Dialysis Technician	6	18.75
5.	Experience in Dialysis		
	Less than 5 Years	7	21.88
	6 - 10 Years	17	53.12
	More than 10 Years	8	25
6.	Continuing education on approaches to reduce carbon Footprint		
	Yes	6	18.75
	No	26	81.25

Comparison of Knowledge Level On Approaches To Reduce Carbon Footprint In Dialysis Centre Among HPs During Pre And Post Test

The pre-test result revealed that 17 (53.13%) HPs had inadequate knowledge, 15 (46.87%) had moderately adequate knowledge and no one had adequate knowledge. In post test, out of 32 HPs, 11 (34.37%) had moderately adequate knowledge, 21 (65.63%) had adequate knowledge and no one had inadequate knowledge. Figure 1 show the distribution of the level of knowledge regarding approaches to reduce carbon footprint in dialysis centre following the instructive intervention among HPs during pre and post test.

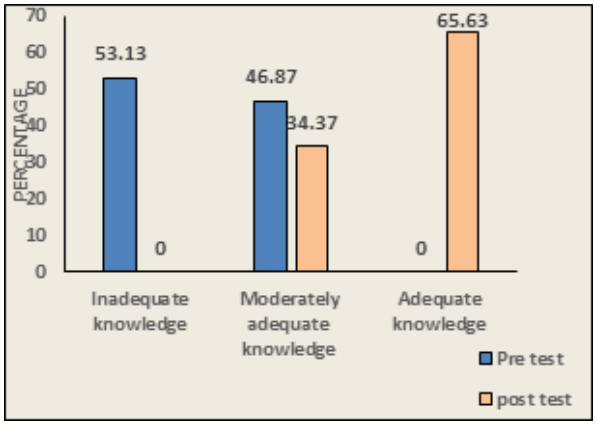

Figure - 1

Effectiveness Of Instructive Intervention On Approaches To Reduce Carbon Footprint In Dialysis Centre Among HPs

Table 2 shows the area wise distribution of difference in knowledge level regarding approaches to reduce carbon footprint in dialysis centre among HPs between pre and post test. With regards to Saving of water energy, mean difference and standard error of the mean were 3.37 and 0.37 respectively with SD of 2.10 and calculated t value was 9.06. It was significant at 0.05 level. The level of knowledge about Saving of electrical energy was significant at 0.05 level. Mean difference was 8.18 with SD of 2.77. Standard error of the mean was 0.49 with calculated t value 16.68. Regarding Recycling of uncontaminated item, mean difference and standard error of the mean were 3.28 and 0.35 respectively with SD of 1.98 and calculated t value was 9.33. It was significant at 0.05 level.

Table - 2

Classification of knowledge	DM (đ)	SD (s)	SEM	't' test value
Saving of water energy	3.37	2.10	0.37	9.06*
Saving of electrical energy	8.18	2.77	0.49	16.68*
Recycling of uncontaminated item	3.28	1.98	0.35	9.33*
Total	14.84	4.65	0.82	18.05*

Note: **DM =Difference mean, SD= Standard deviation, SEM= Standard error of the Mean, * =*Significant* P<0.05**

DISCUSSION

Findings of this study showed that, most HPs were aged between 31 to 40 years, with 59.37% male and 40.63% female. The majority of the HPs were nursing officers (81.25%) than Dialysis Technicians (18.75%). Similar findings were reported from a study from India where average age of the participants was 33 years and 51.6% were female. Educational status and years of experience also varied widely between the subgroups were reported [8]. While comparing the total level of knowledge between pre-test and post-test, the difference mean value was 14.84 with a standard deviation of 4.65 and calculated t value was 18.05. Standard error of the mean was 0.82 and it was statistically significant at P<0.05 level. It is closely related to the study results that the implementation of the awareness program significantly increased the number of participants who scored well in measuring their knowledge with difference mean 7.53 [9, 10].

CONCLUSIONS

After undergoing the Instructive Intervention, HP demonstrated a noteworthy enhancement in their understanding of various approaches aimed at diminishing the carbon footprint within the Dialysis Centre. The training delved into the significance of promoting awareness and adoption of environmentally friendly practices, also known as "eco-dialysis" practices.

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