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Recycling of Temple Waste into Organic Dhoop

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Abstract
Worship is an integral part of Indian's life with offerings, such as flowers, leaves, fruits, and coconuts by the devotees in temples. Effective recycling of such waste can reduce environmental hazards while creating value-added products. The present study was conducted on recycling of temple waste into organic dhoop and assessed the effectiveness of a training program on temple workers regarding recycling practices. An experimental research design with pre-test and post-test focusing on change in knowledge, attitude, practice, and performance without using a control group was used for the study. Findings revealed a significant increase in post-test mean scores. Knowledge about organic dhoop improved from a pre-test mean of 27.16 to 87. Attitude towards temple waste management from pre-test and post-test mean score was 71.1 to 91.1 respectively. Similarly, adoption of practices raised from 70 to 90 mean score of pre-test and post-test. These results highlight that structured training program can effectively enhance knowledge, attitude and sustainable practices among temple workers, promoting eco-friendly waste management and the production of organic dhoop by recycling of temple waste.

Keywords: Recycling, Training Program, Organic dhoop, Temple waste

Introduction

India, with its diverse religions and traditions, has innumerable places of worship where flowers, incense, and other offerings are an integral part of rituals. Among these, temples are the largest contributors to floral waste (Sajid Raja, 2023). Improper disposal of this waste whether in open landfills, rivers, or around sacred trees creates serious environmental and health hazards. Floral waste decomposes slowly, releasing harmful gases and contaminating water bodies, while also serving as breeding grounds for diseases (Sachi Gupta, 2023).

Although some temples, such as the Kashi Vishwanath Temple, have adopted eco-friendly practices like converting floral waste into manure (Isha Yadav, 2015) most places still lack systematic disposal methods. Temple waste, especially discarded flowers, poses a major environmental challenge due to inadequate waste management systems in most religious sites across India (R. N. Patil, 2019). These floral offerings, often left untreated, contribute to pollution but also hold potential for recycling into valuable products such as biogas, essential oils, natural dyes, and incense (Singh, 2017). Unlike synthetic dhoop, which may contain harmful additives, organic dhoop is biodegradable, non-toxic, and capable of releasing natural fragrances with possible health benefits (Prashant Pawar, 2021)

Recycling temple flowers into organic dhoop not only reduces waste but also generates livelihood opportunities for temple workers. With appropriate training, workers can acquire the knowledge and skills to convert discarded offerings into marketable products, supporting both environmental management and income generation (Singh S. D., 2020).

Training programs in floral waste management have shown improvements in participants' knowledge, attitudes, and practices, making them effective tools for sustainable waste utilization. As (Isiaka, 2007) highlights, the effectiveness of such programs lies in their ability to foster learning, skill application, and measurable outcomes.

This study examines how training temple workers in floral waste management, particularly through organic dhoop production, can serve as an eco-friendly, culturally relevant, and cost-effective solution.

Methodology

The training program was organised to raise awareness among temple workers about the preparation of organic dhoop and the effectiveness was evaluated in terms of knowledge, attitude, practices and performance. An experimental design without control group was used for pre-test and post-test knowledge of temple workers was assessed. Purposive sampling technique was used for the study. The target population of the study was temple workers from Amravati City. A list of various temples was compiled and visited. Following conversations with temple workers and based on their enthusiasm for producing organic dhoop, 40 temple workers were selected as participants for the study. A training program was held at four chosen temples, namely Shri. Ambadevi Temple, Isckon Temple, Shri. Gajanan Maharaj Temple, Swami Samarth Center in the city of Amravati. A training program was held at the specified temples for 5 days for each temple. The training program focused on the creation of organic dhoop and outlined the advantages of using organic dhoop. A questionnaire was used as a tool of data collection which includes personal, social and situational information of the temple workers. A knowledge, attitude, practice tests were constructed and administered for data collection before and after the intervention of training program. Following the training program, temple workers underwent a performance assessment to evaluate their comprehension for production of organic dhoop. Z test was conducted to determine the difference between the mean pre-test and post-test of knowledge regarding preparation, process and uses of organic dhoop. The attitude test assessed trainee's views on temple waste management, while the performance test evaluated of dhoop stick making skill in temples.

Results and Discussion

The observation regarding the personal profile and effect of training program in terms of knowledge attitude practice and performance are discussed.

Personal profile of the temple workers

The personal and social profile of the temple workers has influence on the knowledge attitude practice and performance of the individual the observe characteristics are discuss below.

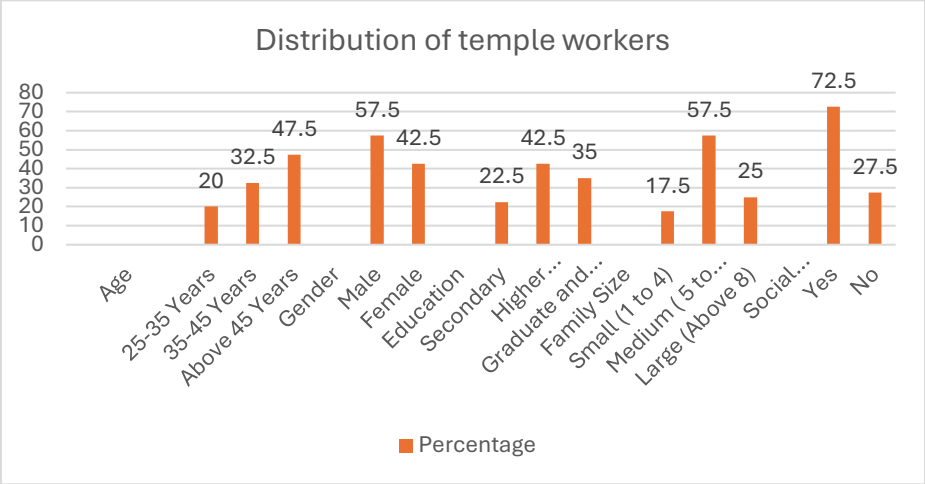

Figure 1: Distribution of temple workers according to age, gender, education, family size and social participation

The data presented in figure 1 shows that, according to age, the 47.50 per cent of temple workers were in the group of above 45 years. The majority of temple workers 57.50 per cent belong to the male category, while the remaining 42.50 per cent belong to the female category. Regarding family size 57.50 per cent of temple workers have a medium family size, while 17.5 and 25 per cent of temple workers have small and large family size respectively. Regarding education the majority of temple workers 42.50 per cent were passed higher secondary, while remaining 22.5 and 35 per cent temple workers were passed as secondary and graduate respectively. In social participation, the majority of temple workers 72.50 per cent did participate in social work while the remaining 27.50 per cent temple workers did not participate in social work.

Change in Knowledge about organic dhoop

The pre-test and post-test knowledge of temple workers about preparation and uses of organic dhoop, and the per cent change in knowledge of the temple workers was calculated. The data is presented given below.

Table 1 - Distribution of temple workers according to the knowledge about temple waste management

S. N	Questionnaire	n=40	
		Pre-test Percentage	Post-test Percentage
	KNOWLEDGE ABOUT TEMPLE WASTE MANAGEMENT		
1	**Environmental effects of throwing temple waste in the open space**		
	a) Stench spreads	32.50	5
	b) Pollution	17.50	2.50
	c)Disease spread	7.50	0
	d)All of the above	42.50	92.50
2	**Effects on the river water due to discharge of temple waste in the river**		

	a) Water pollution	42.50	7.50
	b) Harmful to aquatic animals	25	2.50
	c)Increases harmful microbial activity	10	2.50
	d)All of the above	22.50	87.50

Table 1 presents the distribution of temple workers based on their knowledge of temple waste management. It was observed that 72.50 per cent temple workers was not aware about organic dhoop from temple waste in pre-test while in post-test all temple workers were aware about it. The 42.50 per cent temple workers were aware about impact of throwing temple waste in the open space area in pre-test while in post-test 92.50 per cent temple workers were aware about it. The 22.50 per cent temple workers were aware about effects on the river water due to discharge of temple waste in river while in post-test 87.50 per cent temple workers were aware about it.

Table 2 - Distribution of temple workers according to the knowledge about material required about organic dhoop

S. N	Questionnaire	Percentage (n=40)	
		Pre-test	Post-test
	MATERIAL REQUIRED		
1	**Materials not used to make organic dhoop**		
	a) Butter and honey	32.50	0
	b) Rose Water	27.50	5
	c)Dry temple waste	27.50	5
	d)Wet temple waste	12.50	90
2	**Camphor required to make dhoop from 1 kg of organic temple waste**		
	a)20 g	27.50	7.50
	b)10 g	30	7.50
	c)30 g	25	5
	d)40 g	17.50	80
3	**Quantity of ghee required for 1 kg of organic temple waste**		
	a)10 g	37.50	7.50
	b)20 g	22.50	82.50
	c)40 g	30	5
	d)60 g	12.50	5
4	**Days require to dry organic dhoop in summer**		
	a)3 to 4	27.50	77.50
	b)1 to 2	22.50	5
	c)7 to 8	37.50	12.50
	d)5 to 6	12.50	2
5	**Natural colors used for value addition of organic dhoop**		

	a) Beetroot	7.50	0
	b) Turmeric powder	45	5
	c)Palas flowers	22.50	0
	d)All of the above	25	95

Table 2 presents distribution of temple workers according to the knowledge about the material required for making organic dhoop from temple waste. The data reveals that only 12.50 per cent of temple workers know about the material not required for organic dhoop while in post-test 90 per cent temple workers know about it. Regarding the separation of temple waste for making organic dhoop only 17.50 per cent temple workers know about it while in post-test 97.50 per cent temple workers know about it. In pre-test only 27.50 per cent temple workers had knowledge about required quantity of camphor for making organic dhoop from 1 kg temple waste while majority 80 per cent temple workers were gain knowledge in post-test. Only 22.50 per cent temple workers had known about ghee required to make organic dhoop from 1 kg of organic temple waste in pre-test while 82.50 per cent in post-test. Regarding natural colours used for value addition of organic dhoop 25 per cent temple workers are known about it in pre-test while in post-test majority 95 per cent aware about it. The change in knowledge about material required for organic dhoop was observed

Table 3 - Distribution of temple workers according to the knowledge about benefits and uses of organic dhoop

S.N	Questionnaire	n=40	
		Pre-test Percentage	Post-test Percentage
C	**Benefits and uses**		
1	**Organic dhoop should be stored at**		
	a) In an airtight container	47.50	5
	b) In a dry place	30	7.50
	c)a and b	17.50	87.50
	d)In a humid place	5	0
2	**Precautions should be taken while lighting organic dhoop**		
	a) Put in a metal bowl	30	7.50
	b) Put in a clay panati	45	12.50
	c)a and b	17.50	80
	d)Put on paper	7.50	0
3	**Benefits of using natural organic dhoop**		
	a) Reduced soil pollution	17.50	5
	B) Atmosphere remains pure	30	17.50
	c)Reduced health problems	20	5

	d)All of the above	32.50	72.50

Table 3 presents distribution of temple workers according to the knowledge about benefits and uses of organic dhoop. Data reveals that in the pre-test 17.50 per cent temple workers were known about the storage of organic dhoop while in the post-test 87.50 per cent temple workers known about it. Regarding the precautions taken while lightening organic dhoop only 17.50 per cent known about it in pre-test while in post-test 80 per cent temple workers aware about it. In pre-test 32.50 per cent temple workers knows the benefits of organic dhoop while in post-test 72.50 per cent temple workers known about it.

Table 4 - Assessment of Pre-test level of knowledge regarding Organic dhoop about temple workers

S.N	Level of Knowledge	Score	Pre-test	Post-test
			Percentage	Percentage
1	Low	0-33	82.50	0
2	Medium	34-66	17.50	0
3	High	67-100	0	100

Table 4 presents the frequency and percentage of pre-test and post-test levels of knowledge regarding organic dhoop from temple waste. Majority of temple workers in pre-test 82.50 per cent had low knowledge, while 17.50 per cent had medium knowledge about organic dhoop. However, in the post-test majority 100 per cent temple workers had adequate high knowledge while none of them had moderate and low knowledge about organic dhoop.

Attitude about temple waste management

The pre-test and post-test attitude of temple workers about waste management in temple, and the percent change in attitude of the temple workers was calculated. The data is presented given below.

Table 5 – Distribution of temple workers according to the attitude towards temple waste management

S.N	Statement	Percentage (n=40)									
		Pre-test					Post-test				
		SA	A	UN	D	SD	SA	A	UN	D	SD
1	Management of temple waste	2.50	35	25	32.50	5	40	60	0	0	0
2	Responsibility for cleaning the temple	12.50	35	27.50	20	5	47.50	52.50	0	0	0

3	**Effect of mismanagement of temple waste on the surrounding**	35	40	0	0	0	65	35	0	0	0
4	**Recycling of temple waste**	12.50	32.50	47.50	5	2.50	47.50	50	2.50	0	0
5	**Startup through making organic dhoop**	32.50	35	27.50	2.50	2.50	80	20	0	0	0

***SA-Strongly Agree, A-Agree, UN-Undecided, D-Disagree, SD-Strongly Disagree**

Table 5 shows that the responses of temple workers regarding management of temple waste majority 14 of them agree with the statement in pre-test, while majority 24 of them agree with the statement in post-test with 100% change in attitude. The majority regarding managing the cleanliness in the temple 14 of them agree with the statement in pre-test, while majority 21 of them agree with the statement in post-test with 50% change in attitude. Regarding bad smell and reduced the beauty of temple due to throwing temple waste outside area the majority of them 16 agree with the statement in pre-test, while majority 26 of them strongly agree with the statement in post-test with 85.71% change in attitude. Majority of them 19 temple workers are selected undecided regarding recycling of temple waste in proper way in temple in pre-test, while majority 20 of them agree with the statement in post-test with 53.84% change in attitude. Regarding generation of employment through temple waste majority of them 14 agree with statement in pre-test, while majority 32 of them strongly agree with the statement in post-test with 146.15% change in attitude.

Table 6 - Assessment of level of attitude of temple workers about temple waste management

S. N	**Level of Attitude**	**Score**	**Pre-test**	**Post-test**
			Percentage	**Percentage**
1	Favorable	34-66	32.50	0
2	Highly favorable	67-100	67.50	100

Table 6 shows that in pre-test 67.5 per cent of temple workers had a highly favourable attitude, while 32.5 per cent had a favourable attitude towards temple waste management. In the post-test, 100 per cent showed a highly favourable attitude No one is found in unfavourable category.

Change in adoption of practice about organic dhoop

The pre-test and post-test practice of temple workers about waste management in temple, and the percent change in practice of the temple workers was calculated. The data is presented given below.

Table 7 - Change in adoption of practice about organic dhoop

S. N	**Questionnaire**	**N = 40**	
		Pre-test	**Post-test**
		%	**%**
1	**If recycling how you do with it?**		

	a) Compost	50	20
	b) Organic dhoop	27.50	11
	c)Perfume	10	4
	d)oil	12.50	5
2	**Use of organic dhoop made from temple waste**		
	a) Room freshener	25	25
	b) For offering God	30	30
	c)Mosquito	30	30
	d)All of the above	15	15
3	**What can we contribute to the environment by recycling organic waste?**		
	a) Reduce pollution	40	40
	b) Generate employment	10	10
	c)Sustainable environment	10	10
	d) All of the above	25	25

Table 7 shows that regarding strategy used to manage temple waste only 27.50 per cent temple workers aware about it in pre-test, while in post-test 100 per cent temple workers aware about it. Regarding recycling of temple waste temple workers aware same about in pre-test and post-test. Concerning the use of organic dhoop, temple workers showed similar awareness in both the pre-test and post-test. In respect of contributing to the environment by recycling of organic waste temple workers showed similar practices in pre-test and post-test.

Table 8 - Assessment of Pre-test level of adoption practice regarding temple waste management about temple workers

S. N	Adoption of Practice	Score	Pre-test	Post-test
			Percentage	Percentage
1	Non adoption	0-33	0	0
2	Partial adoption	34-66	60	0
3	Complete adoption	67-100	40	100

Table 8 shows that adoption of temple waste management practices majority 60 per cent of temple workers followed partial adoption and 40 per cent followed complete adoption in pre-test. While in post-test 100 per cent of temple workers followed complete adoption.

Table 9 - Distribution of temple workers according to their level of performance while making organic dhoop after the training program

S. N	Level of Performance	Scores	Percentage
1	Excellent	25-30	15
2	Good	19-24	47.50

3	Satisfactory	13-18	27.50
4	Unsatisfactory	7-12	10
5	Poor	1-6	0

Table 9 shows that level of performance in making organic dhoop. In which majority 47.50 per cent temple workers had good performance, 27.50 per cent had satisfactory performance, 15 per cent had excellent performance and only 10 percent had unsatisfactory performance. None of them had poor performance.

Table 10 - Effectiveness of training program on knowledge, attitude and practice of temple workers about organic dhoop

S. N	Level of Tests	Mean	SD	'Z' Value
1	**Knowledge**			
	Pre-test	27.16	10.17	-30.54
	Post-test	87	7.07	
2	**Attitude**			
	Pre-test	71.1	8.89	-12.69
	Post-test	91.1	4.48	
3	**Practice**			
	Pre-test	70	13.58	-12.83
	Post-test	90	4.35	

*Significance level=0.05, where $P < 0.05$ significance

Table 10 shows that the mean post-test knowledge score 87 was substantially higher than the pre-test knowledge score 27.16, with a Z-value of -30.54. Similarly, attitude scores increased from a pre-test mean of 71.1 to a post-test mean of 91.1 with Z value -12.69, and practice scores rise from 70 to 90 with Z value -12.83. The P value of knowledge, attitude and practice was found significant value at 0.05. Therefore, the null hypothesis was rejected, confirming that the training program had a significant positive effect on the temple workers regarding knowledge, attitude and practice of temple waste management.

Conclusion

Based on the study findings, it can be concluded that the training program was significantly effective in enhancing temple workers regarding knowledge, attitude, and practices about organic dhoop and temple waste management. In post-test intervention, it was observed that temple workers show a substantial improvement in knowledge change 220.32 per cent, attitude 28.12 per cent, and practice 42.85 per cent scores. The results of the Z-test indicated a statistically significant difference ($P < 0.05$) between the pre-test and post-test means, leading to the rejection of the null hypothesis. This confirms that the training had a meaningful impact on increasing awareness and adoption of sustainable practices among temple workers about temple waste management.

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