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VOICE OF THE VOICELESS- INNOVATIVE NUTRITION-HEALTH STRATEGIES TO BOOST THE MORALE OF WOMEN PRISONERS

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ABSTRACT

A formative research was carried out to assess the life-style related health and nutritional problems of women prisoners and need based health promotion initiatives were conducted and the impact assessed. The present study was undertaken with a central aim to promote health among the women prisoners of the Vadodara Central Jail, Gujarat. Vadodara Central Jail was chosen as the site for the study, and 120 women prisoners who were willing to participate were enrolled. Majority of the women belonged to the age group of 31-50 years (43.4%). 68.3% were illiterate and 96.7% were married. The women were from socio-economically under privileged sections of the society. The prevalence of bone disorders was 78% and malnutrition was 61%. Mild mood disturbances (43.3%) and borderline clinical depression (11.7%) was observed. 20% of the inmates were hypertensive. Nutrition health education (NHE) on the topics related to diseases and its management, exercises & yoga were provided to them thrice a week for a period of 3 months. A significant increase in knowledge was seen after the NHE sessions ($p < 0.001$). A kitchen garden concept was successfully implemented in the prison and vegetables grown in the garden were harvested and incorporated in the jail menu. The current jail menu and jail ration followed since 1955, needed modification and revision since it was deficient in important micronutrients like calcium and β carotene. Plain roti was replaced by paushtik (nutritious) roti made by incorporating green leafy vegetables like spinach leaves, fenugreek leaves, radish leaves and drumstick leaves and instead of single dal preparation, recipes containing combination of different variety of dals were implemented. As a ready reckoner a health and wellness manual was designed and published by the investigators which would serve as a reference for health promotion initiatives in all the prisons of Gujarat. Funding: This study was partly funded by UGC (DSA SAP II). Acknowledgements: This work was carried out by my research students Miss Priyanka Joshi and Miss Jemima Chauhan under my guidance and supervision.

Keywords:- formative research, kitchen garden, jail menu, physical activity, health promotion, Nutrition health education (NHE), lifestyle, calcium, β carotene, manual.

INTRODUCTION

The prison population rate of India recorded on 30/12/08 is 32 per 100,000 per national population (National Crime Records Bureau 2010). Prison environment and separation from their family, relatives and friends and long periods of isolation from society have negative impact on their health. Prisoners are more vulnerable to mental and physical health problems as compared to general population and are neglected in terms of health service. Thus prison health as a part of public health should be given recognition to improve overall public health.

The highest number of 82,383 inmates (79,244 male: 3,139 female) were reported from Uttar Pradesh (22.1%) followed by Madhya Pradesh 32,916 (31,381 male: 1085 female), Bihar 28,032 (27,151 male: 881 female) at the end of the year 2011.

There are 19 women jails in our country functioning exclusively for women. Tamil Nadu and Kerala have 3 women jails each and Andhra Pradesh, Rajasthan & West Bengal have 2 women jails each. Bihar, Maharashtra, Orissa, Punjab, Tripura, Uttar Pradesh and Delhi have one women jail each. There are 2 central jails, 8 District jails, 11 Sub jails, 2 open jails and

2 special jails in Gujarat and no women jail and borstal school as per Indian Prison Statistics 2011.

Out of two central jails in Gujarat one is located in Vadodara i.e. Vadodara Central Jail and the other one is located in Ahmedabad i.e. Sabarmati central Jail.

The total numbers of jail inmates in Gujarat recorded at the end of the year 2011 are 11601 out of which 11051 are male inmates and 550 are female inmates. In Gujarat the total number of female inmates are 550 out of which 176 are convicts, 328 are under trials and 46 are detainees recorded at the end of the year 2010 (Source – Indian Prison Statistics 2011, National Crime Records Bureau).

In India very minimal research has been done in the area of prison health and also there is paucity of published data regarding the prison studies particularly related to women prisoners' health needs and effective prison health intervention studies.

Women in prison tend to place a greater demand on the prison health services than men do. This is the case right from the start of their imprisonment, as so many women prisoners have had no contact with health services during the period before admission to prison. As a consequence, most women in prison have little idea of their own health status and may be less aware than most people of healthy lifestyles. Moreover, women in prison have specific health issues; the most prominent are related to reproductive health such as menstruation, menopause, pregnancy and breastfeeding, and mental health & substance abuse issues. Considering the above the present study was undertaken with a broad objective to promote health among the women prisoners of the Vadodara Central Jail through nutrition health intervention and health promotion initiatives.

METHODOLOGY

The research design was reviewed by the panel of members of the Institutional Ethics Committee for Human Research and it was passed under the no. IECHR/2016/6.

The 'No Objection Certificate' was first obtained from the Inspector General of Prisons, Ahmedabad and the Superintendent of the Vadodara Central Jail. Unlike general population, prison population has peculiar characteristics regarding exertion of their rights, thus the following ethical considerations were taken:

All participants were clearly explained that they had free choice to participate or refuse participation in study or drop out at any point in the duration of the study. Informed consent form was taken prior to survey. They were given individual codes and information was obtained in a secure way to ensure confidentiality. The permission was granted for a time period from July to November 2012 to carry out the research work in the

Vadodara Central Jail which was further extended till May 2013.

The present study was carried out on women prisoners in an institutionalized setting of the Central Jail, Vadodara. Initially there were around 150 female prisoners in Vadodara Central Jail, out of which 120 subjects (convicts, under-trials and detained) were enrolled in the study.

The study was divided into four phases –

COLLECTION OF BASELINE DATA OF FEMALE PRISONERS OF VADODARA CENTRAL JAIL

This phase included collection of information on the following aspects –

- Socio-demographic profile
- Reproductive status & morbidity profile
- Mental health
- Anthropometric measurements
- Bone health (Bone mineral density)
- Semi-structured questionnaire was designed and was divided into different sections to collect information on various parameters like age, religion, education, marital status, income level and its source, type and length of imprisonment, types of crimes committed, regarding money order and work done by prisoners in jail, substance use pattern and reproductive status.
- The morbidity profile of women prisoners was assessed using checklist of major and minor health problems.

HEALTH PROMOTION INITIATIVES

- Kitchen garden
A kitchen garden was made in an area of 7500 sq feet around the female barracks in the new women's jail. In the kitchen garden various fruits trees (70 to 80 tree saplings) like chickoo, mango, guava and seasonal vegetables like brinjal, cabbage, cauliflower, fenugreek, radish leaves, drumstick etc. were planted with the help of a professional gardener assisted by jail authorities who were experts in farming and allied activities. The purpose behind the idea of the kitchen garden was to engage the prisoners to help them divert their minds from stress and depression.
- Modifications in the jail Menu
The current jail menu and existing jail ration was analysed and the nutritive value was calculated with the help of food composition tables.
- Promoting physical activity and Yoga

Along with educational sessions on physical activity and health, they were also trained with some exercises and yoga techniques for the purpose of management of non-communicable diseases, bone and joint related disorders

like osteoporosis and osteoarthritis and also for relieving mental stress.

NUTRITION HEALTH INTERVENTION

Female inmates were given need based Nutrition Health Education (NHE) with the help of slide show presentations and verbal explanation of the topics. The following topics were designed on the basis of the needs assessment done –

Topics of NHE

- Anemia, Menopause, Bone health and osteoporosis Osteoarthritis, Diabetes, Physical activity, Healthy eating tips, Substance Abuse, HIV/AIDS

Pictorial presentations were made on the above mentioned topics to the female prisoners with the help of a LCD projector provided by the jail authorities. The NHE was given for 2 months and sessions were held thrice a week.

To assess their knowledge regarding various aspects of nutrition and common health problems, a structured questionnaire was used pre and post intervention. Practices regarding the hygiene were assessed using a checklist.

IMPACT ASSESSMENT

This phase included impact evaluation on knowledge retention of NHE sessions provided to female prisoners. Impact assessment of health promotion initiatives was done by exit interview.

The data collected was entered in the excel sheet under different sections and was analyzed using SPSS (Statistical Package for Social Sciences) version 20.

Frequency and percent responses were calculated for the data regarding socio-demographic profile, health profile, mental health, bone health and nutritional status.

Percent responses were calculated to assess the knowledge retention. Pre and post scores were calculated and appropriate statistical test was applied.

Qualitative data i.e. responses obtained from interview were compiled and categorized. Percent responses were calculated for the same.

RESULTS AND DISCUSSION

BASELINE DATA OF FEMALE PRISONERS OF VADODARA CENTRAL JAIL

Table 1 shows the age-wise distribution of the female inmates of Vadodara Central Jail. The mean age of female prisoners under study was 49.75 years \pm 15.09. 10.8% of the women were of 18-30 years, 43.4% were in the age group of 31 – 50 years, 30% were in 51-65 years and 15.8% were above 65 years of age. It was observed that majority of female inmates belonged to age group of 31 – 50 years (43.4%) followed by women in the age

group of 51 – 65 years (30%). Table 2 shows the data regarding the socio economic characteristics of the subjects.

Table 1 - Age wise Distribution of Female Inmates

Age Group	N= 120	%
18-30 years	13	10.8
31-50 years	52	43.4
51-65 years	36	30.0
>65 years	19	15.8
Mean age	49.75 \pm 15.09	

Table 2 - Socio Demographic profile of Female Inmates

Sr. no.		N = 120	%
1.	Religion		
	Hindu	96	80.0
	Muslim	24	20.0
2	Education		
	Literate	38	31.7
	Illiterate	82	68.3
3	Marital Status		
	Single	4	3.3
	Married	78	65.0
	Widowed	38	31.7
4	Have Children		
	Yes	114	98.3
	No	2	1.7
5.	Employed		
	Yes	75	62.5
	No	45	37.5
6.	Occupation		
	Unemployed	45	37.5
	Government employee	2	1.7
	Private organization employee	14	11.7
	Labourer	19	15.8
	Housemaid	7	5.8
	Agricultural work	26	21.7
	Small scale business	7	5.8
7.	Domicile		
	Rural	84	70.0
	Urban	36	30.0
8.	Household monthly income		
	<3000	53	44.2
	3000 – 6000	52	43.3
	>6000	15	12.5

Majority of the female inmates (80%) were Hindus. 68.3% of them were illiterate. 96.7% of women were married, and of them 31.7% were widowed and only 3.3% were single. Majority (98.3%) of the inmates had children. 62.5% were employed in different types of occupation before coming to prison. Among those who were employed most of them were engaged in agriculture (21.7%) and labour work (15.8%) prior to incarceration. 70% of the inmates were from rural areas. Majority of them had household monthly income either <Rs 3000 or between Rs 3000 to 6000.

The socio demographic profile suggests that majority of the women were from socio-economically under privileged sections of the society. Out of the literate population (31.7%), most of the inmates (57.9%) had primary education, 13.2% had secondary education, 10.5% had higher secondary and 18.4% were graduates and above.

Miscellaneous problems (60%) were the highest that were reported among the female inmates. List of miscellaneous problems reported were as follows: fever, breathlessness, neck pain, lower back pain, pain in hand legs, weakness etc. In a study conducted by ⁽¹⁾ in Bangalore prison, it was found that the commonest problems reported by prisoners were back or neck problems. Similar problems were also reported by the female inmates in the present study.

45% of the inmates reported problems related to gastrointestinal tract. Heartburn and acidity were the highest reported problems by the inmates. Other gastrointestinal problems were flatulence, nausea, vomiting, gastritis, diarrhoea and constipation.

35% of the inmates reported problems related to central nervous system. Tension headache was the highest reported problem under central nervous system. Other problems reported were migraine, sleep disturbances, peripheral neuropathy (table 3).

Table 3- Morbidity profile of the prisoners

Sr. no.	List of problems	N	%
1.	Problems of Oral cavity	20	16.7
2.	Problems of Gastro-intestinal tract	54	45
3.	Problems of Hepatobiliary tract	0	-
4.	Problems of Pancreas	0	-
5.	Problems related to Respiratory tract	28	23.3
6.	Problems related to Cardiovascular system	23	19.2
7.	Problems related to Genito-urinary system	15	12.5
8.	Problems pertaining to Locomotor system	25	20.8
9.	Problems related to Central nervous system	42	35.0

10.	Problems related to Endocrine system	4	3.3
11.	Skin disorders	9	7.5
12.	Eye problems	6	5.0
13.	Miscellaneous problems	72	60

Till date many mega medical camps had been done in the prison, but only preliminary investigations like BP, weight, height and few basic check-ups were done. The data regarding the same was not documented and even follow up was not done. Mental health of the female inmates was assessed using Beck Depression Inventory (BDI). Percent prevalence and degree of depression among subjects obtained are presented in Table 4.

Table 4 - Degrees of depression among female inmates as per Beck Depression Inventory (BDI)

Grades of Depression	N = 120	%
Normal	52	43.3
Mild mood disturbance	52	43.3
Borderline clinical depression	14	11.7
Moderate depression	2	1.7
Severe depression	0	0

Almost half of the female prisoners reported mild mood disturbances (43.3%), 11.7% were found to have borderline clinical depression and only 1.7% showed moderate depression. No severe depression was found among the female inmates according to Beck Depression Inventory (BDI).

In prevalence study conducted by ² among women prisoners in Pakistan, it was found that 43.8% had mild depression, 12.5% had moderate depression, and 3.1% had severe depression.

Mental health in prison frequently remains undiagnosed or under diagnosed. Depression can cause mental impairment. Untreated depression can have serious effects. It diminishes the pleasure of living, including appetite; it can exacerbate other medical conditions and can compromise immune function ³. Thus initiatives were taken in this study to promote mental health among the prisoners through physical activity, yoga and gardening activities.

Data on physical parameters (height and weight) was collected using standard anthropometric techniques. The percent prevalence of underweight, overweight and obesity was calculated.

Table 5 shows the prevalence of malnutrition among female inmates as per Asia pacific cut offs. It was found that 61% of the female inmates were malnourished and out of them 14% were found to be under weight and 37% were obese and 10% were at risk of obesity.

Table 5 - BMI classification of the female prisoners as per Asia pacific cut offs

Grade of malnutrition	N=100	%
Normal (BMI 18.5 – 22.5)	39	39%
Underweight (BMI< 18.5)	14	14%
Overweight (BMI 23 – 24.5)	10	10%
Obese (BMI ≥ 25)	37	37%

Prevalence of under nutrition was found more among the age group of 18 to 30 years. Inmates who belonged to the age group of 51 – 65 years were found to be more obese as compared to others (shown in table 6). Women prisoners face problems of both under and over nutrition, with high number of obese and overweight women especially in the age group 51 years and above.

Table 6 - Age-wise classification of BMI

Age (years)	Total Subjects	Underweight (<18.5)		Normal (18.5-22.9)		Overweight (23.0-24.9)		Obese (≥25.0)	
		N	%	N	%	N	%	N	%
18-30	10	5	50.0	4	40.0	0	-	1	10.0
31-50	42	4	9.5	19	45.2	5	11.9	14	33.4
51-65	31	3	9.7	9	29.0	2	6.5	17	54.8
65+	17	3	17.6	7	41.2	3	17.6	4	23.6

This is of grave and serious concern, since hypertension, mental depression and menopause were also most prevalent in this age group, thereby increasing the risk of non-communicable diseases. Thus it was all the more appropriate to conduct a Nutrition health intervention program suggesting life style modifications.

HEALTH PROMOTION INITIATIVES

Health promotion initiatives were planned looking into the needs assessment, the availability and scope for intervention. Since the majorities of the women were in the middle age (31 – 55 years) and were having osteopenia, moderate levels of depression and life-style related health problems, a practical strategy was devised. To improve mental and physical health, prevent deterioration in health during imprisonment and to encourage them to adopt a positive attitude, the following health promotion initiatives were undertaken:

KITCHEN GARDEN

Contact with nature (gardens and parks) positively impacts blood pressure, cholesterol, outlook on life and stress reduction⁽⁴⁻⁶⁾. From empirical, theoretical and anecdotal evidence it was suggested that contact with nature (gardens and parks) was an effective strategy in the prevention of mental ill health⁽⁷⁾ Exposure to nature enhances the ability to cope with and recover from stress, illness and injury⁽⁸⁾. People have a more positive outlook on life and higher life satisfaction when in proximity to nature⁽⁹⁾.

The women's jail had lot of open spaces between the barracks which could be utilized effectively. A layout of a kitchen garden in a area of 7500 sq. feet with fruit trees and seasonal vegetables was designed and was given for approval to the jail authorities.

Nearly 70 to 80 fruit tree-saplings each 5 feet high (guava, sapota, drumstick, mango) were planted on the boundaries and sidewalks of an area of 7500 sq feet land in the center of two barracks by a professional

gardener, assisted by men prisoners (10 to 15 of them). Since the men prisoners were agricultural farmers and labourers, they had good skill for planting, watering and nurturing the plants. A professional gardener was employed on a daily basis for 3 months immediately after the monsoon season (July to September 2012). Seasonal vegetables which were suitable for Gujarat climate (brinjal, cabbage, fenugreek, tomato, spring onion, cauliflower etc.) were grown and even harvested by December the same year. A garden lawn with carpet grass and landscaping was made towards one part of the wall which could serve as a place for recreation and relaxation for the women prisoners when not in the barracks



Figure 1- A Prison inmate nurturing the plant



Figure 2 - Brinjal plant



Figure 3 - Kitchen Garden in the jail

JAIL MENU MODIFICATIONS

The current jail menu and jail was analyzed for a whole week to assess the meal pattern, types of food items provided and the nutritive value of the menu was calculated using food composition tables.⁽¹⁰⁾

From the menu analysis it was revealed that the allowance for energy, protein, fat, iron, vitamin C, folic acid, thiamine, riboflavin, niacin exceeded the RDA levels. But it was found that the food items in the menu lacked in micronutrients especially β carotene and calcium. The ration if consumed fully will meet the requirements as per RDA except for β carotene and calcium, but it was observed that the daily consumption of food by the inmates was not optimal because it was monotonous, tasteless and less palatable. Since their intake was less, the RDA was not met (table 7 and table 8).

Thus the following modifications have been suggested to improve the nutritive value of the recipes of the menu and also the taste and palatability for a satisfying meal without any additional cost burden to the treasury.

MODIFICATIONS FOR ROTI

The roti served to them was found to be dry and hard. It was thick and difficult to chew and they had to soak it in water before consumption. A paushtik (nutritious) roti made by incorporating green leafy vegetables like spinach leaves or fenugreek leaves or radish leaves or drumstick leaves was suggested in the menu in place of plain roti. Table 7 shows the nutritive value of current Roti followed in the jail. Table 9 shows the nutritive value of the Paushtik Roti

MODIFICATIONS FOR DAL

The dal available in the menu was red gram dal and bengal gram dal alternately with kadhi only on Sundays. The dal preparation was very thin and bland and disliked by all. In a day nearly 9 tins full (15litre) of food was wasted due to less consumption. Instead of single dal preparation, recipes containing combination of different variety of dals were planned. Example: chana-moong dal,

chana-tuver dal, tuver-moong dal and sambhar. To enhance the nutritive value of dal, seasonally available green leafy vegetables like spinach, drumstick leaves, radish leaves etc. was also suggested to be added in the dal preparation (table 10). This was the next health promotion initiative which was well accepted by all the jail authorities and the prisoners as well. The main cook was instructed by the superintendent to see that modifications were implemented. It was accepted because it had no financial burden since the recipes were made using existing jail ration and no extra cost was involved.

PHYSICAL ACTIVITY, EXERCISES AND YOGA

Physical activity, exercises and yoga sessions were held to promote mental and physical health among them. The sessions were held along with NHE sessions thrice a week for 2 months. Before conducting the sessions on physical exercises and yoga, the investigators had taken training from a professional physical health trainer and in turn trained the women prisoners. In the sessions, they were taught stretching exercises – quadriceps stretch, calf stretch, hamstring stretch and specific exercises for lower back knee joint.

Studies have shown clearly that practice of yoga for approximately 2 months definitely reduces the stress and improves the psychological wellbeing in subjects with mental stress (Michalsen *et.al.*, 2005 and Javnbakht *et.al.*, 2009, Nazni *et.al.*, 2013).

A simple pranayama technique ensures better utilization of oxygen from the air that we breathe better utilization of lung surface and the better circulation of oxygenated blood (Telles *et.al.*, 2000, Ravinder, 2006 and Hamer *et.al.*, 2010). Yoga practice has also been shown to influence the cardiovascular system with decrease in heart rate, and blood pressure (Delgado *et al.* 2011). Studies' regarding yoga benefits has also been done in prison settings. A study conducted by to assess the effect of yoga on mental health of incarcerated women, showed fewer symptoms of depression and anxiety over time in those women who participated in the yoga program.

NEED BASED NUTRITION HEALTH INTERVENTION

KNOWLEDGE AND PRACTICES IN VARIOUS ASPECTS OF NUTRITION, HEALTH AND HYGIENE

A specifically structured questionnaire was used to assess the knowledge regarding various aspects of health and nutrition and the data is presented in table 4.30. Initially 70 inmates were expected for the sessions but only 50 women attended all the sessions due to several constraints. There was thus a need to educate them on these issues to improve their quality of life. Nutrition health education sessions were held which specifically targeted the female

Table 7 Nutritive value of roti in the Jail menu

Sr no.	Items	Scale	Energy	Protein	Calcium	Iron	Fat	β- carotene	Vit C	Folic acid	B1	B2	B3
1	Wheat flour	225	767	27.23	108	11.02	0	65	0	80.55	1.1	0.38	9.67
2	Oil	5 ml	45	0	0	0	5	0	0	0	0	0	0
	Total		812	27.23	108	11.02	5	65	0	80.55	1.1	0.38	9.67

Table 8 Nutritive value of dal in the jail menu

Sr no.	Items	Scale	Energy	Protein	Calcium	Iron	Fat	β- carotene	Vit C	Folic acid	B1	B2	B3
1	Tuver dal	50 g	168	11.25	37	1.35	0	66	0	51.5	0.225	0.095	1.45
2	Oil	5 ml	5 ml	0	0	0	5	0	0	0	0	0	0
	Total		213	11.25	37	1.35	5	66	0	51.5	0.225	0.095	1.45
1	Chana Dal	50 g	186	10.4	28	2.65	0	65	0	0.24	0.09	1.2	0.24
2	oil	5 ml	45	0	0	0	5	0	0	0	0	0	0
	Total	231	10.4	28	2.65	5	65	0	73.75	0.24	0.09	1.2	231

Table 9 Nutritive value of Paushtik roti

Sr no.	Items	Scale	Energy	Protein	Calcium	Iron	Fat	β- carotene	Vit C	Folic acid	B1	B2	B3
1	Wheat flour	225	767	27.23	108	11.02	0	65	0	80.55	1.1	0.38	9.67
2	Drumstick leaves	50	46	3.35	220	0.425	0	3390	110	0	0.03	0.025	0.4
3	oil	5 ml	45	0	0	0	5	0	0	0	0	0	0
	Total		858	30.58	328	11.445	5	3455	110	80.55	1.13	0.405	10.07
1	Wheat flour	225	767	27.23	108	11.02	0	65	0	80.55	1.1	0.38	9.67
2	Fenugreek leaves	50	25	2.2	198	0.965	0	1170	26	0	0.02	0.155	0.4
3	oil	5 ml	45	0	0	0	5	0	0	0	0	0	0
	Total		837	29.43	306	11.985	5	1235	26	80.55	1.12	0.535	10.07
1	Wheat flour	225	767	27.23	108	11.02	0	65	0	80.55	1.1	0.38	9.67

2	Spinach	50	13	1	37	0.57	0	2790	62	14	0.015	0.13	0.25
3	oil	5 ml	45	0	0	0	5	0	0	0	0	0	0
	Total		825	28.23	145	11.59	5	2855	62	94.55	1.115	0.51	9.92
1	Wheat flour	225	767	27.23	108	11.02	0	65	0	80.55	1.1	0.38	9.67
2	Radish leaves	50	14	1.9	133	0.045	0	2648	41	0	0.09	0.245	0.4
3	oil	5 ml	45	0	0	0	5	0	0	0	0	0	0
	Total		826	29.13	241	11.065	5	2713	41	80.55	1.19	0.625	10.07

Table 10 Nutritive value of Mixed Dal recipe

Sr no.	Items	Scale	Energy	Protein	Calcium	Iron	Fat	β -carotene	Vit C	Folic acid	B1	B2	B3
1	Tuver dal	25g	83.75	5.57	18.25	0.67	0	33	0	25.75	0.11	0.04	0.72
2	Moong dal	25g	87	6.12	18.75	0.975	0	12.25	0	35	0.11	0.05	0.6
3	Onion	10g	5	0.12	4.69	0.06	0	0	1.1	0.6	0.008	0.001	0.04
4	Tomato	10g	2	0.09	4.8	0.064	0	35.1	2.7	3	0.012	0.006	0.04
5	Oil	5 ml	45	0	0	0	5	0	0	0	0	0	0
	Total		222.75	11.9	46.49	1.769	5	80.35	3.8	64.35	0.24	0.097	1.4
1	Tuver dal	25g	83.75	5.57	18.25	0.67	0	33	0	25.75	0.11	0.04	0.72
2	Channa dal	25g	93	5.2	14	1.325	0	32.25	0.25	36.87	0.12	0.045	0.6
3	Onion	10g	5	0.12	4.69	0.06	0	0	1.1	0.6	0.008	0.001	0.04
4	Tomato	10g	2	0.09	4.8	0.064	0	35.1	2.7	3	0.012	0.006	0.04
5	Oil	5 ml	45	0	0	0	5	0	0	0	0	0	0
	Total		228.75	10.98	41.74	2.119	5	100.35	4.05	66.22	0.25	0.092	1.4
1	Channa dal	25g	93	5.2	14	1.325	0	32.25	0.25	36.87	0.12	0.045	0.6
2	Moong dal	25g	87	6.12	18.75	0.975	0	12.25	0	35	0.11	0.05	0.6
3	Onion	10g	5	0.12	4.69	0.06	0	0	1.1	0.6	0.008	0.001	0.04
4	Tomato	10g	2	0.09	4.8	0.064	0	35.1	2.7	3	0.012	0.006	0.04
5	Oil	5 ml	45	0	0	0	5	0	0	0	0	0	0
	Total		232	11.53	42.24	2.424	5	79.6	4.05	75.47	0.25	0.102	1.28

inmates to improve their knowledge levels for better control and management of such diseases.

DEVELOPMENT OF IEC MATERIALS

Nutrition books, research reports and some authentic websites were referred and relevant information was collected from these sources on the following topics:

- Anemia
- Menopause
- Bone health and osteoporosis
- Osteoarthritis
- Diabetes
- Physical activity
- Healthy eating tips.
- HIV
- Substance abuse

Power point presentations were prepared in local language including pictures and graphics so that it could be easily understood by the female inmates as most of them were illiterate.

IMPARTING NUTRITION HEALTH EDUCATION

Health and nutrition education is a key tool to bring about behaviour change in prevention and management of nutritional disorders. A study conducted by ⁽¹⁸⁾ assessed the impact of nutrition program on the health benefits of prisoners and showed that health education and proper diet improved anthropometric and biochemical parameters in the patients with cardiovascular risk factors. Thus need based Nutrition health education was imparted to the women prisoners. Hygiene practices were found to be excellent among female inmates and so topics on hygiene were not much emphasized. Sessions on the relevant topics were scheduled in the afternoon 4 to 5 pm, three times a week for two months. They were held in the computer room of the prison and pictorial presentations with the help of projector were shown to them and were explained verbally. Sessions for under trials and convicts were held separately as they were not allowed to interact with each other.

IMPACT ASSESSMENT

The post data on knowledge retention was collected using the same questionnaire after all the NHE sessions were over after 2 months. The overall picture shows that there was improvement in the knowledge of the inmates regarding health and nutrition aspects, which would help them to improve lifestyle in prison and adapt healthy choices within the confined environment of the prison.

CONCLUSION

The responses showed that the prison authorities were pleased with the health promotion activities that

were done for the prison inmates. The impact of health promotion initiatives can be clearly observed from the responses. The purpose of kitchen garden was served as inmates felt relieved of stress when they sat around the garden or did gardening activity. Modified recipes were accepted by both prison officials and prisoners and these are still being followed in the jail menu till date. The purpose of NHE sessions and physical activity sessions had brought a positive change in the habits of the inmates. As a ready reckoner a health and wellness manual was designed and published by the investigators which would serve as a reference for health promotion initiatives in all the prisons of Gujarat.

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