Effectiveness of comprehensive nursing intervention program (CNIP) on knowledge and practice regarding the prevention of non-insulin-dependent diabetes mellitus (NIDDM) among adults

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Abstract:

BACKGROUND: There are estimated 72.96 million cases of diabetes in the adult population of India. The prevalence in urban areas ranges between 10.9% and 14.2%, and the prevalence in rural India ranges between 3.0% and 7.8% among the population aged 20 years and above with a much higher prevalence among individuals aged over 50 years. This study aimed to determine the effectiveness of comprehensive nursing intervention program (CNIP) on knowledge and practice regarding the prevention of non-insulin-dependent diabetes mellitus (NIDDM) among adults.

MATERIALS AND METHODS: A quasi-experimental one-group pretest–posttest design was chosen for the study. Adults were selected using a simple random sampling technique by the lottery method; of 120 eligible adults, 60 were selected to participate in the study. The study was conducted in an urban community, Bangalore, and data were collected from March 25, 2022, to April 23, 2022. CNIP consisted of education, demonstration of exercise, and information booklet. The pretest and posttest were collected using the structured knowledge questionnaire for assessing the level of knowledge and non-observational checklist for assessing the level of practice among adults. Data were analyzed by descriptive and inferential statistics.

RESULTS: There was significant improvement in the mean scores of knowledge from 52.3 to 82.2 and practice mean score from 45.5 to 68.4. The paired *t*-test value of knowledge was 3.88, and practice was 2.97, which was significant at *P* < 0.05 level.

CONCLUSIONS: The study concluded that CNIP had a great role in increasing the level of knowledge and practice among adults in the prevention of NIDDM.

Keywords:

CNIP, demonstration of exercise, education, information booklet

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Introduction

Diabetes mellitus (DM) is a widespread disease among all age-groups that is characterized by hyperglycemia, abnormal insulin production, impaired insulin utilization, or both.[1] By 2025, it is estimated that the number of people with diabetes will reach 300 million worldwide, and a new case is diagnosed every 40 seconds.[2,3] India has been designated the "Global Capital of Diabetes," with the most diabetic patients (35 million).[4] Maximum deaths are estimated to occur due to diabetes every year, and

the most affected age-group is between 35 and 64 years. The World Health Organization (WHO) estimates 177 million people have diabetes worldwide.[5] The incidence of disease would surge by 170 to 228 million from 84 million in developing countries.[6] By 2025, China's diabetic population will have doubled to 34 million from 17 million.[7] The overall prevalence rate of diabetes in the country was 11.8 percent, with men and women both equally affected.[8] Twelve percent more men were affected in comparison with women due to diabetes.[9] Eight percent of the total burden in the country is due to diabetes, and the remaining 3.8 percent of people were newly diagnosed cases.[10,11] The prevalence rate of diabetes is increasing with the growing age.[12] However, India's diabetic population is lacking behind in controlling glucose level. A maximum of 60.5 percent of India's diabetic patients is lacking blood sugar control, whereas 85.7 percent population is receiving oral medication.[13] Adult blindness, end-stage renal failure, and diabetic foot all occur in patients with advanced DM.[14] In addition, about 73% of adults with diabetes have hypertension.[15] India was expected to have 57 million diabetic patients by 2025.[16] Nearly 10% to 11% of the 'total of 25 million patients in India are urban diabetics.[17] The disease affects 10% of the wealthy and nearly 33% of the general population.[18-20]

A survey conducted shows that Karnataka and Punjab were the two states where the population was significantly at higher risk of developing diabetes. Karnataka has a 7.5% prevalence of DM, but it is among the top 3 when it comes to prediabetes and risk factors for noncommunicable diseases.[21] Unfavorable changes in lifestyle and dietary habits associated with urbanization were thought to be the most important factor in the development of diabetes. Diabetes was approximately twice as prevalent in cities as it was in rural areas. Simple lifestyle practices such as healthy food patterns, exercise, stress management, and recreational activities, which are lacking, should be initiated in the early stages of life. They could be helpful in the prevention of noncommunicable diseases. Here, the researcher felt that the incidence of DM is increasing in the young population, and this combination of interventions may be useful for the vulnerable population to prevent DM. Hence, the investigator selected the comprehensive nursing intervention program (CNIP) because imparting knowledge and practice among adults is beneficial for their prevention of disease and health maintenance.

Materials and Methods

Study design and setting
The research design used was a quasi-experimental, one-group pretest and posttest design. The data were collected for four weeks. The study was conducted in Upanagar, an urban community in Bengaluru, Karnataka, India. Data were collected from March 25, 2022, to April 23, 2022.

Study participants and sampling
The adult subjects, aged 30 to 60 years, were identified through an extensive house-to-house-based survey conducted in 434 houses by the research investigator. The total number of eligible adults was identified as 120, of which 60 subjects were chosen for the study via the lottery method using simple random sampling techniques [Figure 1].

Sample size estimation
The sample size of the study was calculated considering knowledge as a primary outcome variable. A similar study was conducted by Ho LS, Gittelsohn J, Rimal R, Treuth MS, Sharma S, Rosecrans A, Harris SB. An integrated multi-institutional diabetes prevention program improves knowledge and healthy food acquisition in northwestern Ontario First Nations (Health Education and Behavior[22] 2008). The sample size was estimated using power analysis (α = 5% and power (1-β) = 80%) and the effect size is 0.73. A total of 50 subjects were needed to achieve a significance of 0.05. The sample size was estimated, and the study required 50 subjects. About 20% was added for attrition, and a total of 60 samples were required.

Criteria for sample selection
The inclusion criteria include both males and females aged between 31 and 60 years, and those who can able to read and write Kannada and English. The exclusion criteria include adults who have been diagnosed with DM and healthcare professionals.

Data collection tools and techniques
The tool consists of three parts: Section A consists of demographic information such as age; gender;
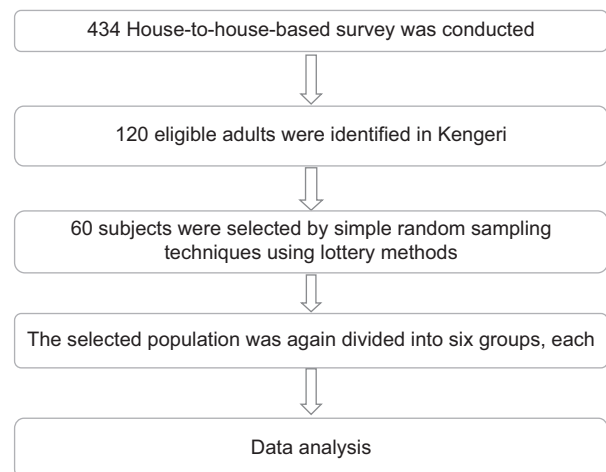

Figure 1: Sample selection and data collection for the study

religion; educational, marital, and occupational status; dietary habits; height in feet; and weight in kg. Section B consists of 24-item questionnaire with two domains: general information = 11 items and preventive strategies = 13 items; on non-insulin-dependent diabetes mellitus (NIDDM), interpretation of the tool as less than 50% = inadequate knowledge; 50–75% = moderately adequate; and >75% = adequate knowledge. Section C is non-observational checklist which had 12 items, interpretation of the tool as less than 50% = poor; 50–75% = average; and >75% = good practice.

The split-half method was used, and reliability was found to be 0.87 for knowledge and 0.85 for practice. The tool was feasible and reliable for conducting the research study.

CNIP

The total duration taken by the research investigator to conduct the research study was of four weeks. The researcher got permission and informed consent for the study from the concerned authorities at Primary Health Centre, Kengeri, and Upanagar urban community, Bangalore. The eligible samples were selected based on a simple random sampling technique using lottery methods; the pretest was conducted using structured knowledge questionnaires and a non-observational checklist. Followed by the pretest research investigator, they implemented a CNIP that covered education, demonstration, and re-demonstration. Education session focuses on diet, lifestyle modification (stress management techniques, relaxation, smoking cessation), and exercise with the help of power point, flashcards, and charts on the prevention of NIDDM among adults. The total time taken was 30 minutes, and the total participants were divided into six groups with 10 members in each group. Followed by demonstration session was organized on exercise about aerobics with the duration of 15 minutes. Re-demonstration of exercise was performed for 15 minutes by the participants, and they were asked to practice exercise for 20 days continuously. The participants received an informational booklet at the end of the demonstration session.

A posttest was performed after 20 days using the same tool to assess the knowledge and practice regarding the prevention of NIDDM.

Ethical consideration

The study was approved by the research ethics committee at the Padmashree Institute of Nursing, and formal permission was obtained from the concerned authorities at Kengeri, Upanagar, and PHC with the registration number 05_N316_119595 on March 25, 2022, and informed consent was obtained from the subjects.

Data analysis

Using the Statistical Package for the Social Sciences (SPSS) version 20.0, the analytical process of data calculation was carried out. A paired *t*-test was used to analyze the mean difference in knowledge score between pretest and posttest, which was found to be significant at $P < 0.05$ levels.

Results

As shown in Table 1, the majority of 60 subjects (24, or 40%) were aged between 41 and 50 years. There were more males (33, 55%) than females. The demographic

Table 1: Demographic characteristics of adults (*n*=60)

Demographic variables	Categories	No.	%
Age in years	a. 31–40 year	13	21.7
	b. 41–50 years	24	40.0
	c. 51–60 years	18	30.0
	d. 60 and above	5	8.3
Gender	a. Male	33	55.0
	b. Female	27	45.0
Religion	a. Hindu	31	51.7
	b. Muslim	1	1.7
	c. Christian	28	46.7
	d. Others	-	-
Marital status	a. Unmarried	6	10.0
	b. Married	46	76.7
	c. Divorced	5	8.3
	d. Widow/widower	3	5.0
Type of family	a. Nuclear family	30	50.0
	b. Joint family	27	45.0
	c. Extended family	3	5.0
Educational status	a. Primary education	23	38.3
	b. Secondary education	18	30.0
	c. PUC	5	8.3
	d. Graduate and above	14	23.3
Occupational status	a. Daily wager	16	26.7
	b. Govt. employee	14	23.3
	c. Pvt, employee	15	25.0
	d. Housewife	5	8.3
Family income per month	a. ≤10, 000	1	1.7
	b. 10, 001 − 15,000	18	30.0
	c. 15,001-20,000	23	38.3
	d. >20,000	18	30.0
Dietary habit	a. Vegetarian	28	46.7
	b. Nonvegetarian	32	53.3
Height (ft)	a. 4.6-5.5	21	35.0
	b. 5.6-6.6	23	38.3
	c. 6.6-7.5	16	26.7
Weight (kg)	a. 51-60	21	35.0
	b. 61-70	21	35.0
	c. 71-80	18	30.0
	d. 80 and above	-	-
BMI	a. Underweight (<18.5 kg/m^2)	-	-
	b. Ideal (18.524.9 kg/m^2	20	33.3
	c. Overweight (25.0-29.9 kg/m^2)	26	43.3
	d. Obese ≥30 kg/m^2	14	23.4

characteristics showed that of 60 participants, 23 (38.3%) of the participants had a primary education, and 16 (26.7%) were daily wagers. Table 1 shows additional characteristics.

Figure 2 indicates the pretest level of knowledge: The majority of 31 adults (51.7.%) had inadequate knowledge, 29 adults (48.3%) had moderately adequate knowledge, and none of the adults had adequate knowledge, whereas in the posttest, the majority of 30 adults (50.0%) had moderately adequate knowledge, 30 adults (50.0%) had adequate knowledge, and none of the adults had inadequate knowledge.

This demonstrates that, following the administration of a CNIP, the majority of adults gained an understanding of the need for knowledge about the prevention of NIDDM and achieved a moderately adequate level of knowledge when compared to pretest results.

Figure 2 indicates the acquired result of the pretest level of practice: The majority of 28 adults (46.7%) had average practice, 32 adults (53.3%) had poor practice, and none of the adults had good practice, whereas in the posttest, the majority of 49 adults (81.7%) had average practice, 11 adults (18.3%) had good practice, and none of the adults

had poor practice regarding the prevention of NIDDM among adults. This demonstrates that, following the administration of a CNIP, the majority of adults gained an understanding of the need for practice about the prevention of NIDDM and achieved an average level of practice when compared to pretest results.

As shown in Table 2, the baseline mean score was 11.55; the posttest mean score is 18.80; the change in mean is 7.30 for knowledge; the baseline mean score was 21.88; the posttest mean score is 32.82; and the change in mean is 45.5%, which indicates that there was an improvement in the level of knowledge and practice after the administration of a CNIP among the study population. Comprehensive nursing interventions have a positive impact on increasing the level of knowledge, which influences the quality of life (QoL) of adults.

As shown in Table 3, the overall mean score was 7.30, with the standard deviation (SD) of 3.52; the mean difference was 30.4; and the paired *t*-test value was 16.047, which shows a highly significant difference at $P < 0.001$. The highest mean percentage was found to be in aspects of prevention of NIDDM, while the lowest percentage was found to be in general information.

The overall mean and mean difference in level of practice were 10.83, the SD was 7.92, the mean difference was 22.56, and the paired *t*-test value was 10.692. These show a highly significant difference, that is, $P < 0.001$.

This shows that most subjects were unaware of knowledge and had poor practice regarding the preventive aspects of NIDDM, and after CNIP, the subjects gained a high level of knowledge and good practice about the preventive aspects of NIDDM, which was effective in improving knowledge and practice among adults regarding the prevention of NIDDM.

Correlation between knowledge and practice (n = 60)

The correlation was carried out in terms of level of knowledge and practice. In the pretest, r was found to be 0.128 and $P > 0.05$, whereas in the posttest, r was found to be 0.146 and $P > 0.05$, which indicates a positive but not statistically significant result at $P < 0.05$.

Discussion

The study was conducted among adults to enhance their level of knowledge and practice on the prevention of NIDDM after the implementation of CNIP. Study results show that in level of knowledge, the majority (50.0%) of adults had adequate knowledge, 30.0% had moderately adequate knowledge, and none had inadequate knowledge. The study discovered that, in terms of
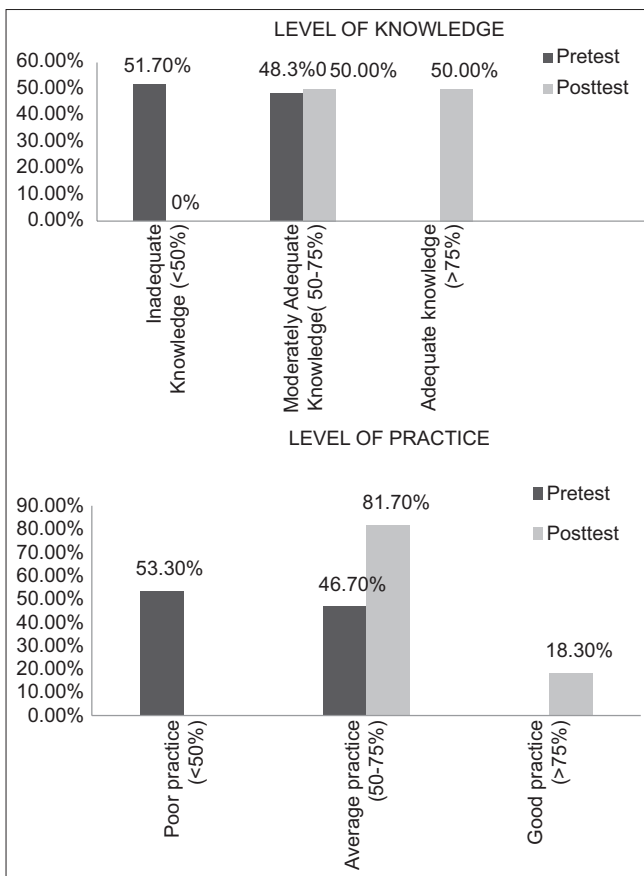

Figure 2: Level of knowledge and practice in the pretest and posttest

Table 2: Range, mean, and SD of pretest and posttest (*n*=60)

Aspects of level of knowledge and practice regarding prevention of NIDDM	Max. score	Pretest				Posttest			
		Range	Mean	SD	Mean %	Range	Mean	SD	Mean %
General information	13	3-12	6.80	2.39	52.3	8-13	10.68	1.32	82.2
Prevention of NIDDM	11	2-9	4.70	1.46	42.7	6-11	8.12	1.34	73.8
Overall knowledge	24	6-18	11.55	2.94	48.1	15-23	18.80	2.16	78.5
Level of practice	48	12-34	21.88	5.68	45.5	25-46	32.82	5.08	68.4

Table 3: Comparison of knowledge and practice in the pretest and posttest (*n*=60)

Aspects of level of knowledge and practice regarding prevention of NIDDM	Max. score	Mean difference	SD of difference	% of mean difference	Paired *t*-test value	P
General information	13	3.88	2.92	29.8	10.290*	*P*<0.05
Prevention of NIDDM	11	3.41	1.56	31.0	16.906*	*P*<0.001
Overall knowledge	24	7.30	3.52	30.4	16.047*	*P*<0.001
Level of practice	48	10.83	7.92	22.56	10.692*	*P*<0.05

Note: * denotes significant (*P*<0.05) for df=59

practice, 49 (81.7%) of the adults had average practices, another 49 (81.7%) had good practices, and none of the adults had poor practices. The baseline mean score was 11.55; the posttest mean score is 18.80; the change in mean is 7.30 for knowledge; the baseline mean score was 21.88; the posttest mean score is 32.82; and the change in mean is 45.5% for level of practice.

A cross-descriptive study was conducted to identify relationships between knowledge and practice regarding the prevention of NIDDM. The results revealed that maximum subjects had inadequate knowledge and poor practice, and there was a statistically significant low correlation between total knowledge and practice (r = 33, *P* = 0.01).[23] Another study was conducted to find out the incidence of DM and factors associated with its development. Around 1065 adults with an average age of 45 were randomly selected for the study. During the period of a three-year follow-up, the incidence of diabetes was 1.6 per 100 people. Thus, the study concluded that there is a need for education to improve the knowledge of adults and bring down the incidence rate of DM.[24]

A similar study was conducted in a rural village in India as part of a community-based diabetes prevention and management education program. A total of 703 village people were selected and were aged between 10 and 92 years. The trained trainer administered educational interventions for participants to improve knowledge. The study results show that there was improvement in the level of knowledge, reduction in fasting blood glucose, and other parameters. The conclusion of the study intervention was effective in reducing parameters in obesity and change in dietary pattern subjects. The study suggests that community-based education is needed in India to control the DM prevalence.[25,26]

Most adults and family members may not be aware of the preventive aspects of DM. Nurses working in the clinical setting can utilize a CNIP to impart knowledge regarding prevention. Similar educational programs can be conducted frequently by nursing personnel in community settings to increase public awareness. Nursing administrators can formulate the protocol on diet, lifestyle modification, exercise, and other interventions for at-risk population to decrease the prevalence of DM. The study interventions can be prepared to involve the family members.

A technology can be used to develop the app to administer this intervention to the public with the help of funding and voluntary agencies. The findings of this study provide the basis for conducting the community-based interventions, which are essential and play a major role for healthcare professionals to decrease the prevalence rate in the community.

Limitations and recommendations
The project is constrained in certain ways. Depending on their educational background, their level of expertise may vary. The study only includes one group of participants and lacks randomization because it cannot be generalized.

The study recommends that multiple posttest can be conducted among adults to identify the long-term impact of intervention, which can help in the prevention of NIDDM. Periodical reinforcement sessions can be conducted to maintain the QoL participants.

Conclusions

This study concluded that the intervention of the CNIP was significantly effective in increasing the level of knowledge and practice. As nurses have a vital role in the community for public health, we need to organize certain health program; hence, the public have adequate knowledge and good practice on preventive aspects

of chronic diseases, which can reduce the prevalence of major diseases. The study suggests that periodical community-based long-term program needs to be organized to make aware of public and to reduce the prevalence of DM.

Conflicts of interest

There are no conflicts of interest.

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