Section: Miscellaneous

Original Research Article

EFFECT OF HEALTH EDUCATION INTERVENTION ON AVERAGE DAILY STEP COUNT AMONG NURSING OFFICERS IN A GOVERNMENT MEDICAL COLLEGE & HOSPITAL OF HARYANA

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ABSTRACT

Background: Physical inactivity is a major modifiable risk factor for non-communicable diseases such as cardiovascular disease, diabetes mellitus, obesity, and certain cancers. Health education interventions have been recognized as an effective strategy to promote physical activity by increasing knowledge, motivation, and self-efficacy. Interventions focusing on simple, achievable goals such as increasing daily step count are particularly suitable for busy healthcare workers.

Materials and Methods: This is a Quasi-experimental, before–after interventional study conducted over a period of four months from August 2024 to November 2024. A total of 112 nurses were included in the study. Appropriate statistical tests were used for calculation of various parameters.

Results & Conclusion: In conclusion, the telephonic health education intervention resulted in a statistically significant increase in average daily step count among nursing officers. Given the sedentary baseline activity levels observed, structured behavioral reinforcement through periodic telephonic contact may serve as a feasible and cost-effective workplace strategy to promote physical activity among healthcare professionals with 3030.00 ± 1424.51 steps before intervention vs 3360 ± 1393.40 after intervention.

Keywords: Health education, Physical inactivity, Steps.

INTRODUCTION

Physical inactivity is a major modifiable risk factor for non-communicable diseases such as cardiovascular disease, diabetes mellitus, obesity, and certain cancers. Globally, approximately one third of adults do not meet the recommended levels of physical activity. Insufficient physical activity contributes substantially to morbidity, mortality, and economic burden on health systems.[1] Regular physical activity, even in moderate forms such as walking, has been shown to improve cardiometabolic health, mental well-being, overall quality of life and reduces the all-cause mortality in adults. Walking is a familiar, inexpensive and accessible physical activity for all age groups.[2-4] Step count, measured objectively using pedometers or mobile-based applications, has emerged as a simple and practical indicator of daily physical activity.[5]

Nursing officers constitute a critical workforce within the healthcare system and play a pivotal role in patient care, health promotion, and disease prevention. Despite being health professionals, nurses are often exposed to long working hours, rotating shifts, high job stress, and irregular work patterns, which may adversely affect their own health behaviors, including physical activity levels. Evidence suggests that healthcare workers, particularly nurses, may have lower levels of leisure-time physical activity and a higher prevalence of lifestyle-related risk factors compared to the general population. This paradox highlights the need for

targeted interventions aimed at improving health behaviors among nursing personnel.[6,7]

Health education interventions have been recognized as an effective strategy to promote physical activity by increasing knowledge, motivation, and self-efficacy. Interventions focusing on simple, achievable goals such as increasing daily step count are particularly suitable for busy healthcare workers, as they are low-cost, easy to implement, and can be integrated into routine work schedules.[8]

Despite this, there is limited research evaluating health education interventions targeting objectively measured physical activity among nursing officers in Indian public healthcare settings. Understanding the effectiveness of such interventions within the context of a Government Medical College & Hospital in Haryana is essential to support the health of nursing professionals and may help in designing occupational wellness programs. Therefore, this study aims to assess the effect of a health education intervention on average daily step count among nursing officers in this setting.

MATERIALS AND METHODS

Study Design and study setting: This is a Quasi-experimental, before–after interventional study conducted over a period of four months from August 2024 to November 2024. This study was conducted among nursing officers working at a tertiary care institute of India. This tertiary care institute was started in the year 2022 in rural area having bed strength of 440 beds.

Sample Size: The sample size was calculated using the formula n= (Zα/2+ Zβ)2*σ2/ Δ2, Where, n = required sample size, Zα/2 = standard normal deviate corresponding to the desired level of significance, Zβ = standard normal deviate corresponding to the desired power, σ = standard deviation of the difference in the outcome variable before and after the intervention and Δ = expected mean difference between pre- and post-intervention values. Two-sided type 1 error was assumed as 0.05 and power as 80% to detect a 10% change in average daily step count from a assumed baseline mean of 3000 steps/day and standard deviation of 1000 steps. Using these values, the minimum required sample size came out to be 88 participants. After accounting for a 10% attrition rate, the final sample size was set at 100 nursing officers.

Study Participants: Nursing officer working in the tertiary care hospital on either regular or contractual basis.

Inclusion Criteria:

Those who had a working smartphone and were willing to install the application in their phone were included in the study.

Exclusion Criteria:

Those who didn't consent for the study and who were not able to walk due to temporary or permanent physical disability.

Sampling Strategy: As the total number of nursing officers in the institute was 120, we decided to do universal sampling considering inclusion- exclusion criteria and drop out rate.

Study tools: The study tools used were Google fit application in smartphones, electronic weighing machine, stadiometer, measuring tape, electronic B.P. instrument and a pre-designed, pre-tested semi-structured schedule. This schedule was used to collect data on demographic details and questions related to substance abuse like tobacco and alcohol intake. Google fit is smartphone-based application which measures average number of steps/days. This is a valid and more accurate application to count steps in different populations as compared to wrist worn Actigraphy.[10-12]

Height and weight were measured using Stadiometer and digital weighing scale, respectively. Overweight and obesity were assessed by calculating BMI. For the Indian population, BMI 18.5 - 22.9 kg/m2 was taken as normal, 23 -24.9 kg/m2 was considered as overweight and ≥25 kg/m2 was considered as obesity. Waist circumference (WC) was measured at the approximate midpoint between the lower margin of the last palpable rib and the top of the iliac crest. Hip circumference measurement was taken around the widest portion of the buttocks. Central obesity was defined as WC ≥90 cm for men and ≥80 cm for women or waist to hip ratio (WHR) ≥0.85 for women and ≥0.95 for men.[15]

Blood pressure was measured in sitting position on the right arm using Omran automatic blood pressure monitor, after 15 min of rest. Systolic and diastolic blood pressure was taken as the means of two readings taken 5 min apart. Hypertension was defined as the study participants either having raised systolic or diastolic blood pressure (≥140 or ≥90 mmHg, respectively) or taking treatment for hypertension. Current tobacco users were taken as those who were using any form of smokeless or smoked tobacco products at the time of survey. Current alcoholics were those who consumed any form of alcohol. A person was not considered current tobacco or alcohol user if he/she has left these substances for last one year.[15]

Intervention: The intervention included health education sessions conducted weekly over mobile for 12 consecutive weeks. It was 10 minutes duration and included the following content:

- Why moving matters, every step counts
- Just friendly reminders to increase daily steps
- Simple ideas to increase daily steps:
  - Take the stairs,
  - walk during breaks like lunch break
  - Walk while talking
  - If possible, find your buddy
- Encouragement when they hit their targets
- Safety tips:
  - wear comfortable footwear,
  - maintain proper posture
  - stay hydrated

Data Collection: The participants were approached through meetings called in four groups on consecutive days to include all nursing officers working in different shifts. The study and its purpose were explained to them. Then written informed consent was taken from all the participants who were willing to participate in the study and were ready to install the said application in their smartphone. Fitness application (Google Fit) was installed on the smartphones of those who consented for it.

Then the participants were interviewed individually in next 1 week at their convenient time (mostly after their shift ended) by the investigator using interview technique and baseline measurements of weight, height, hip and waist circumference and BP were taken. Physical activity in the form of daily average steps was measured from the readings of the installed application. The participants were asked about the convenient time and day (one fixed day in a week) to call for a health education.

After the baseline measurement of all eligible participants was complete, intervention was given weekly for next 12 weeks, through mobile phone on every Sunday or the fixed day suggested by each participant. If any participant could not attend the call, he/she was called again after an hour and on next day. If any participant was busy at the time of call, he/she was asked a convenient time to call again. Follow-up data was collected after one week of health education intervention to see the changes in the physical activity level using the same study tools and parameters.

Statistical Analysis: Collected data was entered in the MS Excel spreadsheet, coded appropriately and later cleaned for any possible errors. Categorical data was presented as frequency and percentages (%). Normally distributed data was presented as means and standard deviations. Paired T- test was used to compare means of quantitative variables before and after intervention. All tests were performed at a 5% level of significance; thus, an association is significant if the p value was less than 0.05.

Ethical Clearance: Ethical approval was obtained from the Institutional Ethical Committee of the Medical College with approval number SABVGMC/ IEC/ 2024/03 dated 29/05/2024. The study was conducted in accordance with the ICMR National Ethical Guidelines for Biomedical and Health Research Involving Human Participants (2017) and the principles of the Declaration of Helsinki. The study adhered to the ICMR the New Drugs and Clinical Trials Rules (2019), where applicable. Informed consent was obtained from the participants before data collection. The participants were explained the aims of the study, their rights regarding participation in the study and the confidentiality of their responses before the study was started.

RESULTS

Total 120 nursing officers were posted to the study hospital, out of which baseline data of 112 could be collected. The reasons for exclusion at the baseline were pregnancy,[3] long leaves or deputation,[4] and temporary disability due to accident.[1] All other participants consented for the study, and all had smartphones. There was no dropout and all participants completed the intervention. Of the total 89.3% (100) participants attended all 12 calls and rest attended 10 or 11 calls of the health education intervention.

All study participants belonged to Hindu religion. Most of them were females (91.1%) and married (96.4%). None of them were separated, divorced or widowed. About two thirds of the participants were 35 years or less and the mean age of study participants was 32.95 ± 5.45. Mean family income was 165580.35 ± 66,937.85 Rs. Of the total, 4.4% of participants were current tobacco users and nearly 9% were current alcohol users [Table 1].

Baseline anthropometric and physiological parameters of the study participants is described in [Table 2]. Average step count among study participants increased from baseline of 3030.00 ± 1424.51 to 3360 ± 1393.40 after the intervention which was statistically significant. On stratified analysis, increase in average daily step count before and after intervention was significantly higher among females, married, family members less than or equal to four, family income ≤1,00,000 Rs and not currently using alcohol. Age and caste category does not any significant association on stratified analysis [Table 3].

Table 1: Details of demographic and substance abuse among study participants (n = 112)

Variables		Frequency (Percentage)
Gender	Male	10 (8.9%)
	Female	102 (91.1%)
Age group	≤35 years	73 (65.2%)
	>35 years	39 (34.8%)
Marital Status	Married	108 (96.4%)
	Unmarried	04 (3.6%)
No. of Family members	≤4	67 (59.8%)
	>4	45 (40.2%)
Caste category	General	83 (74.1%)
	SC/ ST	13 (11.6%)
	Other Backward Class	16 (14.3%)
Family income	≤1,00,000	53 (47.3%)
	>1,00,000	59 (52.7%)
Current Tobacco users	Yes	05 (4.4%)

	No	107 (95.6%)
Current Alcohol Users	Yes	10 (8.9%)
	No	102 (91.7%)

Table 2: Details of baseline anthropometric and physiological parameters among study participants

Variables	Mean ± SD
Average no. of daily step count	3030.00 ± 1424.51
Weight	64.46 ± 8.22
BMI	24.62 ± 2.83
Hip circumference (inch)	38.22 ± 2.88
Waist circumference (inch)	30.62 ± 2.43
Systolic BP (mmHg)	120.98 ± 5.36
Diastolic BP (mmHg)	80.05 ± 4.00

Table 3: Effect of intervention on average daily step count on stratified analysis (n = 112)

Variables		Average daily step count		P value (Paired T-Test)
		Before Intervention (Mean ± SD)	After Intervention (Mean ± SD)	
Total Average daily step count		3030.00 ± 1424.51	3360 ± 1393.40	0.041
Gender	Male	3600.00 ± 1169.92	3800.00 ± 788.81	0.186
	Female	2974.12 ± 1439.75	3317.75 ± 1434.36	0.053
Age group	≤35 years	2860.11 ± 1314.33	3078.22 ± 1265.22	0.240
	>35 years	3348.00 ± 1579.61	3889.74 ± 1482.49	0.083
Marital Status	Married	3048.09 ± 1447.55	3407.50 ± 1386.45	0.031
	Unmarried	2541.50 ± 125.29	2100.00 ± 1039.23	0.405
No. of Family members	≤4	2797.90 ± 1476.19	3345.67 ± 1441.54	0.012
	>4	3375.58 ± 1283.11	3383.33 ± 1334.21	0.974
Caste category	General	3083.22 ± 1487.30	3405.54 ± 1432.85	0.085
	SC/ ST	2940.00 ± 1192.09	3115.38 ± 1210.27	0.743
	Other Backward Class	2827.06 ± 1311.61	3328.13 ± 1381.30	0.247
Family income	≤1,00,000	2797.45 ± 1310.40	3454.91 ± 1673.18	0.011
	>1,00,000	3238.90 ± 1500.08	3276.27 ± 1091.08	0.852
Current Tobacco users	Yes	2328.60 ± 1051.65	2490.90 ± 990.4	0.012
	No	3062.78 ± 1449.00	3424.39 ± 1393.45	0.032
Current Alcohol Users	Yes	3328.80 ± 1162.75	3000 ± 666.67	0.543
	No	3000.71 ± 1449.13	3396.18 ± 1442.23	0.020

DISCUSSION

The present study evaluated the effectiveness of a phone-based health education intervention on average daily step count among nursing officers in a government medical college and hospital. The intervention demonstrated a statistically significant improvement in mean daily step count from 3030.00 ± 1424.51 at baseline to 3360 ± 1393.40 post-intervention (p = 0.041), indicating that regular motivation over phone may positively influence physical activity behavior among healthcare professionals. The observed improvement in step count is consistent with previous evidence. Peyman N et al. (2018) in their study concluded that using innovative and digital media-based health education can be effective in improving health-based behavior such as physical activity.[17] Similarly. Shcherbina A also noted that smartphone-based interventions increase daily step counts.[18]

The baseline step count observed in this study reflects a predominantly sedentary lifestyle. According to Tudor-Locke et al., individuals taking fewer than 5,000 steps per day are categorized as sedentary.[19] Despite working in a hospital setting, the nursing officers in the present study had average step counts substantially below the recommended levels. The reason might be due to lower patient loads as the hospital started in its nascent stage.

Stratified analysis revealed important socio-demographic variations in intervention effectiveness. Although both males and females showed increases in step count, statistical significance was detected among females. The reason might be predominantly female study population (91.1%) or higher responsiveness of females to structured health counseling. Married participants showed significant improvement compared to unmarried participants. Social support within marital relationships may contribute to greater adherence to lifestyle modification behaviors, as family encouragement is known to influence physical activity engagement in adults.[20,21]

Participants with four or fewer family members demonstrated significant increases in step count, whereas those with larger families did not. This may reflect reduced domestic responsibilities and time constraints among individuals with smaller households, allowing greater opportunities for engagement in physical activity. Similarly, participants with family income ≤ ₹1,00,000 showed significant improvement, whereas higher-income participants did not demonstrate meaningful change. One possible explanation is that lower-income participants had lower baseline step counts and therefore greater scope for improvement. Structured behavioral guidance may particularly benefit individuals who may not otherwise prioritize leisure-

time physical activity. Socioeconomic disparities in physical activity patterns have been documented globally, with lower-income groups often reporting lower baseline activity levels.[22,23]

Lifestyle factors also influenced intervention outcomes. Non-alcohol users exhibited significant increases in step count, whereas alcohol users did not show improvement. Health behaviors often cluster together, and individuals engaging in one healthy behavior are more likely to adopt others.[24] Similarly, although tobacco users demonstrated statistical significance, the small number of tobacco users (n=5) warrants cautious interpretation of this finding.

Although the increase in average daily step count was statistically significant, the magnitude of improvement (approximately 330 steps/day) was modest. However, even small increments in daily step count may have benefit on all-cause mortality and cardiovascular events.[25] Therefore, continued reinforcement and longer-duration interventions may yield greater health impact.

Telephonic counseling offers a feasible, low-cost, and scalable strategy, particularly in busy healthcare settings where time constraints may limit participation in structured exercise programs. The high adherence observed in this study—nearly 90% attending all 12 calls and no dropout—further demonstrates the acceptability and practicality of telephonic health education among nursing staff.

Strengths and Limitations: The study has several strengths, including complete follow-up, high adherence to intervention calls, and objective measurement of step count. However, certain limitations should be acknowledged. The predominantly female and homogeneous religious composition of the sample restricts generalizability. Additionally, the short duration of follow-up does not permit assessment of long-term sustainability of behavior change.

CONCLUSION

In conclusion, the telephonic health education intervention resulted in a statistically significant increase in average daily step count among nursing officers. Given the sedentary baseline activity levels observed, structured behavioral reinforcement through periodic telephonic contact may serve as a feasible and cost-effective workplace strategy to promote physical activity among healthcare professionals. Future studies employing randomized controlled designs and longer follow-up periods are recommended to evaluate sustained impact and associated improvements in anthropometric and physiological outcomes.

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