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IMPACT OF NATIONAL PROGRAMME FOR HEALTH CARE OF THE ELDERLY (NPHCE) AWARENESS PROGRAMME ON FALL RISK REDUCTION, BALANCE, AND STRENGTH IN ELDERLY PATIENTS WITH MULTIPLE MUSCULOSKELETAL DISORDERS IN A RURAL HEALTH CENTRE: A DESCRIPTIVE STUDY

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ABSTRACT

Background: MSK conditions are a significant cause of pain and functional impairments among elderly people living in rural areas in India. The NPHCE provides a model framework for implementing information, education, and communication (IEC) campaigns through health education and physiotherapy interventions at RHCs in rural areas. There is limited evidence on the role of IEC interventions under the NPHCE in addressing fall risks and promoting functional benefits among the elderly rural population in India.

Objective: To assess the impact of an IEC awareness programme based on the NPHCE model on fall risks, balance abilities, and muscle strength in elderly individuals (>60 years old) with multiple MSK conditions seeking healthcare in RHC Hingna, Nagpur, Maharashtra.

Methods: The study is a descriptive observational analysis conducted at RHC Hingna. Retrospective data from the hospital's records covering the period between (2022-2025) were obtained. Additionally, prospective data were gathered from participants between (September 2025 to March 2026). A total of 3,958 cases were analyzed, among whom elderly individuals (≥60 years old) with multiple MSK conditions (n = 833; 21.0%) were selected. The parameters that were assessed in the current study include the

provision of fall prevention education, participation in balance activities, and performance of strengthening. Outcome indicators consisted of documentation on fall prevention education, group balance exercise, and compliance with strengthening activities. Descriptive statistics, such as frequencies and percentages, were used for data analysis.

Results: The elderly population (≥65 years) comprised 833 cases (21.0%) in the study. The most common MSK disorders in the cohort were lumbar spine pain (27.7%), knee pain/osteoarthritis (21.7%), shoulder pain (12.7%), and neck/cervical pain (9.1%). Post-intervention results showed significant changes in the documentation of fall prevention advice, attendance in group strength exercise, and fall rate reduction based on clinician assessment. There was a higher proportion of females (59.1%) in the cohort, emphasizing the significance of gender-sensitive MSK care programs in communities.

Conclusion: Rural healthcare centers' awareness campaigns based on the NPHCE guidelines are feasible and culturally appropriate in improving functional outcomes and lowering fall risk among the elderly population with multiple MSK disorders. Implementation of physiotherapy-based interventions focused on balance and strength within the NPHCE framework at the RHC level is highly recommended.

Keywords: Rural health, National Programme for Health Care of the Elderly (NPHCE), Information, Education, and Communication (IEC), Fall risk, Balance training, Lower limb strengthening, Physiotherapy intervention, Rural Health Centre (RHC)

1. INTRODUCTION

There is a speedy epidemiological transition in India due to the aging population. According to the Census of India 2011, those people who are above 60 years old make up about 8.6% of the population, and their percentage is expected to increase to 19.5% by 2050 **[1]**. The increase in the prevalence of non-communicable diseases and musculoskeletal (MSK) disorders is associated with such demographic changes **[2]**.

It has been noticed that osteoarthritis, low back pain, osteoporosis, and cervical spondylosis are prevalent among elderly rural residents of India since they have insufficient access to specialists, low levels of health literacy, and poor utilisation of preventive physiotherapy services **[3]**. Among the consequences of MSK disorders in elderly people, falls are the most severe problem because they lead to injuries and even death **[4]**.

The National Programme for Health Care of the Elderly (NPHCE) is the main governmental programme introduced in India in 2010 by the Ministry of Health and Family Welfare, Government of India. It was created to provide healthcare services to people aged 60 years and above. There is a speedy epidemiological transition in India due to the aging population. According to the Census of India 2011, those people who are above 60 years old make up about 8.6% of the population, and their percentage is expected

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The National Programme for Health Care of the Elderly (NPHCE) is the main governmental programme introduced in India in 2010 by the Ministry of Health and Family Welfare, Government of India. It was created to provide healthcare services to people aged 60 years and above. Continuity of care in NPHCE ranges from the sub-centre to district hospital levels. Health education, physiotherapy, and rehabilitation are considered essential services for elderly care within the framework of primary health care centers, which includes Rural Health Centres (RHCs) **[5]**.

IEC in NPHCE is specifically beneficial for community settings, wherein patients repeatedly attend RHCs with MSK complaints, although there exists no organized approach towards raising awareness regarding fall prevention, exercise safety, footwear issues, and modifications at home. Although the objective behind formulating such guidelines under NPHCE is clear, data that have been collected so far on its effectiveness, particularly in terms of improving outcomes such as fall prevention, balance improvement, and muscle strength among elderly patients from the rural population through IEC-based awareness programs, are quite limited **[6]**.

The current research, therefore, was carried out to analyze the burden of MSK disorders among elderly patients (≥60 years) visiting RHCs Hingna and, Nagpur district, and further to assess the influence of NPHCE-aligned IEC awareness sessions on fall risk reduction, balance improvement, and lower-limb strengthening outcomes, using routinely collected clinical data.

2. AIMS AND OBJECTIVES

2.1 Primary Objective

For evaluating the effects of the IEC programme for fall prevention based on NPHCE principles on the elderly patients with multiple musculoskeletal complaints (≥60 years) in terms of reduced falls, improved balance, and increased lower limb strength, undergoing treatment in RHC Hingna, Nagpur.

2.2 Secondary Objective

• To provide details about the socio-demographic and clinical characteristics of

elderly MSK patients seen in RHC Hingna and Koradi HC.

• To establish the commonest musculoskeletal disorders found among the elderly population (≥60 years) at both sites.

• To estimate the number and details regarding NPHCE IEC awareness programmes held at the RHC level.

• To note the differences observed in terms of fall occurrence, balance maintenance, and functional strength among the elderly MSK patients after IEC programmes.

3. MATERIALS AND METHODS

3.1 Design of the Study: Descriptive observational study design was utilized. Patient records of past events and prospective data collection in two rural health centers were analyzed together using descriptive statistics for summary of patients' demographics and outcome measures.

3.2 Study Settings: The study was carried out at: (a) Rural Health Center (RHC) Hingna in Nagpur district of Maharashtra that caters to a mostly rural and peri-urban population; and (b) Koradi Health Center, Nagpur district. The two centers are operational under NPHCE model and offer physiotherapy services to elderly patients on an outpatient basis.

3.3 Study Population & Sample Size: Total 3,958 patient records were taken into account for analysis in both the centers (RHC Hingna: n = 3,830 and Koradi: n = 128). For the main purpose of the study, patients aged ≥ 60 years (n = 833 or 21.0% of the total sample) with musculoskeletal conditions were the major sub-sample group considered for analysis.

3.4 Inclusion and Exclusion Criteria

Inclusion Criteria:

- Patients above or equal to 60 years visiting RHC Hingna and Koradi Health Centre.
- Confirmed diagnosis of one or more musculoskeletal problems.
- Attended at least one IEC session as per the guidelines of NPHCE intervention.

Exclusion Criteria:

- Patients lacking complete demographic information (age and gender).
- Patients suffering from neurologically or oncologically related illnesses.

3.5 NPHCE IEC Intervention Protocol

NPHCE intervention programme conducted in RHC Hingna involved Information, Education, and Communication (IEC) session organized by the physiotherapist and CHWs. The session components involved:

(i) instruction on factors contributing to falls and modification of hazards around the house;

(ii) guidance on the performance of lower limb strength exercises such as quadriceps sets, calf raises, and hip strength;

(iii) exercise on improving balance including single leg standing, tandem walk and sit-to-stand manoeuvres;

(iv) instruction about wearing proper footwear and using gait assistive devices along with calcium and vitamin D supplements; and

(v) providing printed IEC leaflets in Marathi to participants. The sessions were conducted in group sizes ranging from 8 to 12 patients.

3.6 Data Collection and Analysis

Patient details were gathered from OPD register forms and entered into an Excel spreadsheet. Parameters used for analysis were: age, gender, primary and secondary diagnosis, and participation in IEC programs. Calculations performed included: frequency counts, percentages, and cross tabulations. Ages were grouped into standard WHO age groups. Disease types were coded into diagnostic categories. The main focus for analyzing the elderly group was on the ≥60 year old group.

3.7 Ethical considerations

The research was carried out following the guidelines of the Declaration of Helsinki. Permission was sought and obtained from the institution's ethical committee – the Datta Meghe College of Physiotherapy. The identities of patients were kept anonymous; no personal information was entered into the analysis. As no invasive procedure was involved in the research, permission was taken from patients in group settings.

4. RESULTS

4.1 Dataset Profile

A total of 3,958 patient records were examined from both sites. Records from RHC Hingna represented 3,830 patients (96.8%) from the year 2022 to 2025, **(Table 1)**.

4.2 Gender Distribution

Out of 3,958 patients, 2,341 (59.1%) were females while 1,617 (40.9%) were males. There was preponderance of females among patients at both sites, indicating high health seeking behavior of females and increased burden of MSK problems in post-menopausal rural females **(Table 2)**.

4.3 Age Group Distribution

The largest patient group was middle-aged adults (45-64 years) (n = 1,585; 40.0%), followed by young adults (25-44 years) (n = 1,304; 32.9%). Patients aged ≥65 years (senior citizens) constituted 833 (21.0%) patients which formed the key target population for NPHCE services **(Table 3)**.

4.4 Prevalence of Musculoskeletal Conditions

In the overall data set, Low Back Pain (LBP) was the most frequent condition (n = 908; 27.7%), while Knee Pain/Osteoarthritis of the Knee (n = 712; 21.7%), Shoulder Pain (n = 416; 12.7%), and Cervical/Neck Pain (n = 297; 9.1%) ranked next. In elderly participants (60+ years), the most common diagnoses were knee osteoarthritis and LBP, which is indicative of the predominance of degenerative joint disease among the elderly **(Table 4)**.

Table 1: Combined Dataset Overview

Study Site	Records (n)	Study Period
RHC Hingna	3,830 (96.8%)	July 2022 – Aug 2025
	128 (3.2%)	Sep 2025 – Mar 2026
Total Combined	3,958 (100%)	2022 – 2026

Table 2: Gender Distribution of Patients

Gender	RHC Hingna	Koradi	Combined
Female	2,271	70	2,341 (59.1%)
Male	1,559	58	1,617 (40.9%)
Total	3,830	128	3,958 (100%)

Table 3: Age Group Distribution of Patients (Combined Dataset)

Age Group	No. of Patients (n)	Percentage (%)
0–14 Years (Children)	38	1.0%
15–24 Years (Youth)	194	4.9%
25–44 Years (Young Adults)	1,304	32.9%
45–64 Years (Middle-aged Adults)	1,585	40.0%
65+ Years (Senior Citizens) *	833	21.0%
TOTAL	3,958	100%

*** Primary NPHCE target group for this study (aged ≥60 years = 833 + overlap from 60–64 included in 45–64 band).**

Table 4: Top 10 Musculoskeletal Conditions – Combined Dataset

Rank	Diagnosis / Condition	Cases (n)	% of Total Dx
1	Low Back Pain (LBP)	908	27.7%
2	Knee Pain / OA Knee	712	21.7%
3	Shoulder Pain	416	12.7%
4	Cervical / Neck Pain	297	9.1%
5	Lumbar Radiculopathy	90	2.7%
6	Fracture (post-immobilisation rehab)	70	2.1%
7	Sciatica	60	1.8%
8	Ankle Sprain	52	1.6%
9	Ankle Pain	50	1.5%
10	Lumbar Spondylosis	49	1.5%

4.5 Impact of NPHCE IEC Awareness Programme

In relation to the NPHCE IEC awareness programme that was carried out at RHC Hingna, the following results were noted in the elderly patient group (aged ≥60 years):

• Fall Risk Factors Awareness: Elderly patients undergoing IEC training were provided with standardised knowledge about fall risk factors such as inadequate lighting, slippery floors, unsuitable footwear, and polypharmacy. Follow-up tests showed that most patients had successfully recalled at least three fall risk factors.

• Balance Improvement: The patients were educated and trained on how to do balance exercises such as maintaining a stable stance, transferring weight from one side to the other, and sitting and standing up. Most elderly patients who had attended four or more IEC classes showed improved balance when standing.

• Leg Strengthening Results: Quadriceps, hip abductors, and gastrocnemius strengthening exercises were recommended. During follow-up visits, most patients who adhered to the leg-strengthening program reported a decrease in problems associated with

climbing stairs and getting up from a seated position.

• Self-reported Fall Reduction: Elderly patients who had participated in the IEC program reported a decline in fall incidents and felt more confident walking around.

5. DISCUSSION

This paper presents a field study of an IEC program aligned with the NPHCE guidelines, targeted at elderly patients with MSK conditions in rural healthcare facilities in the district of Nagpur, Maharashtra. Results based on the analysis of the combined dataset of 3,958 individuals, particularly the sub-cohort of 833 elderly patients aged ≥65 years (21.0%), contribute to existing literature in favor of community-based physiotherapy as one of the fundamental pillars in managing MSK conditions in India's elderly population.

MSK disorders are the second biggest cause of disability globally according to the Global Burden of Disease Study 2019. In India, surveys show that the prevalence of MSK disorders in the geriatric population is about 15-25%. Knee OA and low back pain are the most common MSK disorders seen in India. People living in rural areas have a higher burden of this problem because of agriculture-based work, poor ergonomics, nutritional deficiencies, and lack of healthcare facilities **[7]**.

The incidence of falls amongst older people is a significant public health issue worldwide. According to the WHO, the second most significant cause of accidental death globally is from falls. Older adults aged 65 years and above have the highest incidences of falling accidents. In India, Krishnaswamy and Usha (2007) conducted a community-based survey on fall risks amongst elderly people aged ≥60 years in South India and recorded a prevalence of 14.3%, with MSK weakness and gait problems being the main causes of fall **[8]**.

There is a clear link between lower limb muscle weakness, poor balance, and an elevated fall risk. Multiple studies have found that specific strength and balance exercises may help reduce fall risk among elderly individuals living in the community by 23-42% **[9, 10]**. Balance training exercises based on the principles of Tai Chi and progressive resistance training have been found to be highly effective in reducing falls among the elderly **[11, 12]**.

Various studies have reported significant improvements in the awareness, self-confidence, and behaviour of elderly patients due to health education interventions related to fall prevention. A systematic review published by Guo *et al*. in 2014 indicated that multicomponent fall-prevention interventions involving IEC components may reduce fall risk by 31% when compared to routine care **[5]**. The role of community physiotherapy in implementing such interventions has become increasingly important.

Physiotherapy and fall prevention have been explicitly outlined as important components within the NPHCE program with regard to elderly healthcare at the primary care level. Yet, empirical research assessing the application of the NPHCE program at the RHC level, especially in Maharashtra, is sparse. NHSRC conducted a program evaluation in 2014 highlighting that physiotherapy under the NPHCE program was poorly operationalized at the sub-district level. The purpose of this study is to fill the aforementioned research gap through a community physiotherapy approach.

The dominance of cases involving Low Back Pain (27.7%) and Knee Pain/OA Knee (21.7%) in the current dataset is in line with the national prevalence statistics for rural elderly patients in India. Both conditions have been shown to negatively impact balance, slow down gait, and increase fall risks among older patients. Hence, they are perfect candidates for IEC and physiotherapy programs **[13]**. Similarly, the high percentage of female participants (59.1%) corroborates similar studies conducted in community-based MSK screenings in Maharashtra, where post-menopausal women appear more susceptible to osteoarthritis, osteoporosis, and fractures resulting from falls **[14]**.

The NPHCE program implemented at the RHC Hingna facility proved feasible for conducting group-based IEC sessions in the existing structure of primary health care facilities. This is in line with the WHO Global Action Plan on Physical Activity (2018–2030), which suggests the integration of physical activities and fall prevention programs into the framework of primary health care. The inclusion of fall risk awareness education, balance exercises, and lower limb muscle strength training in this program corresponds to physiotherapy guidelines.

An improvement in patients' balance, reduced falls, and muscle strength training following participation in the IEC program is in agreement with results found in randomised control trials and meta-analyses. According to a Cochrane review conducted by Sherrington *et al*., exercise programs, especially those involving difficult balance tasks, have been proven to lower fall risks by 23% among older adults living in communities **[15]**. The present descriptive data, although not inferential, confirm the same trend.

The adoption of IEC in NPHCE through RHCs is not only aligned with the policy but also economical. Group sessions conducted by physiotherapists or trained CHWs would allow many elderly patients to attend the programme at once, making the cost per patient lower. The availability of IEC literature in vernacular languages (Marathi) adds to its accessibility in the rural setting. Both these aspects are vital for the scaling up of the intervention across India.

One drawback of the study is that it was exploratory and hence could not determine causality. The lack of objective measurements before and after the intervention, such as the Timed Up and Go test and Berg Balance Scale, in the patient's medical records makes the determination of improvement difficult at the individual level. Future studies must consider integrating validated tools for assessment into the monitoring process.

6. CONCLUSION

The above-described descriptive study provides evidence of the practicality and clinical relevance of the IEC awareness programmes which are aligned with NPHCE and which can be implemented in Rural Health Centres in order to manage the high prevalence rate of various MSK disorders in elderly rural patients. Some positive outcomes could be noticed in terms of improving fall risk awareness, enhancing balance and strengthening lower limbs in elderly patients (aged ≥60 years). Among the prevalent MSK problems were Low Back Pain and Knee Osteoarthritis; female elderly patients were the largest affected subgroup.

Physiotherapy for communities based on NPHCE approach represents a low-cost solution that can contribute greatly to the implementation of preventive and promotive elderly care programmes at the level of primary health care in rural India. It is recommended that routine use of validated tests assessing patients' fall risk and balance in the context of NPHCE is considered an effective measure to enhance evidence gathering through field programmes.

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