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Prevalence And Determinants Of Frailty Among Institutionalized Older Adults In The Kalyan-Dombivli Region: A Cross-Sectional Study

Dr. Sheetal. Khanderao. Aurangabadkar (PT)[1], Dr. Sandip. Kumar. Parekh (PT)[2]
[1]PhD. Scholar, Department of Physiotherapy, Parul Institute of Doctoral Studies, Parul University, Vadodara Gujarat.
[2]PhD, MPT(ORTHO), Professor, Parul Institute of Physiotherapy and Research, Faculty of Physiotherapy, Parul University, Vadodara, Gujarat.

Abstract

Background: *Frailty increases the risk of falls, hospitalization, institutionalization, and death, yet remains amenable to targeted interventions when detected early. Evidence from Indian care homes is limited.*

Methods: *We carried out a descriptive cross-sectional study (August – December 2024) in two old-age homes in Kalyan-Dombivli, India. All residents ≥ 60 years who were ambulant, cognitively intact, and consented were included (n = 248). Frailty was assessed with the Edmonton Frail Scale (EFS, 0–17). Sociodemographic data, comorbidities, assistive-device use, fall history, and concern about falling (Falls Efficacy Scale-International, FES-I) were recorded. Frailty was dichotomised (non-frail = EFS ≤ 5). Associations were explored with χ^2 tests and Spearman's ρ ($\alpha = 0.05$).*

Results: *Mean age was 73.1 ± 6.2 years; 50.4 % were women. Overall, 179 residents (72.2 %) were frail: mildly frail 38.7 %, moderately frail 25.4 %, severely frail 8.1 %. No significant association was found between frailty and sex, hypertension, diabetes, assistive-device use, or fall history ($p > 0.05$). Spearman's analysis showed no correlation with age, body-mass index, length of stay, or number of falls, but a weak positive correlation with FES-I score ($\rho = 0.14$, $p = 0.025$). Residents reporting high concern about falling (69 %) were more often frail, although this narrowly missed conventional significance ($p = 0.055$).*

Conclusion: *Almost three-quarters of institutionalized older adults in this region are frail, yet classic risk markers such as age, sex, and comorbidity were not predictive. High fear of falling emerged as the only independent signal. Routine frailty screening combined with programmes that rebuild confidence and balance may therefore deliver greater benefit than disease-focused strategies alone.*

Keywords: *frailty; Edmonton Frail Scale; institutionalized elderly; aging; fear of falling; cross-sectional study; India.*

INTRODUCTION

Frailty is a multidimensional geriatric syndrome marked by diminished physiological reserves and heightened vulnerability to stressors [1]. Prevalence estimates vary widely—from 11 % to almost 60 % in Indian community studies—because of differing assessment tools and settings [2, 3]. What's clear is that institutionalised elders fare even worse than those living at home, with frailty driving longer hospital stays, disability, and mortality [4]. Here's the thing: frailty is not an inevitable consequence of ageing. Reversal is possible through exercise, nutrition, and psychosocial support when modifiable drivers are recognised early [5, 6]. Yet many homes still rely on clinical intuition instead of structured instruments, and Indian data remain patchy. The Edmonton Frail Scale (EFS) offers a rapid, validated alternative that covers cognition, functional independence, nutrition, and mood in less than five minutes [7]. Coupling it with the Falls Efficacy Scale-International (FES-I) adds insight into fear-related inactivity—a potential catalyst for sarcopenia and decline [8]. Conceptually, frailty sits on the shifting boundary between normal ageing and overt disability. Unlike disability, which reflects irreversible loss of function, frailty is dynamic and bidirectional: an infection, polypharmacy, or even a short period of bed rest can tip an older adult from robust to dependent, yet targeted rehabilitation can pull them back. Two frameworks capture this fluidity. The phenotype model proposed by Fried et al. bundles weight loss, exhaustion, weakness, slow gait, and low physical activity into a clinical signature [1]. The deficit-accumulation model tallies comorbidities, symptoms, and laboratory abnormalities into a frailty index that rises as physiological buffers erode. The EFS borrows elements from both, distilling them into an easy bedside checklist that fits busy primary-care clinics and crowded wards [7]. India's demographic curve makes the issue urgent. By 2050, one in five citizens—roughly 319 million people—is expected to be aged ≥ 60 years [2]. Longevity without functional

independence burdens families who still provide most elder care and strains public health budgets already stretched thin. The National Programme for Health Care of the Elderly labels frailty a priority condition, yet surveillance indicators remain vague and implementation uneven. Robust regional data are the missing first step. From a clinical vantage point, frailty amplifies medication toxicity, prolongs postoperative recovery, and blunts vaccine responses. At the systems level, it drives demand for long-term residential care, most of which in India remains unregulated. Mapping the pattern of frailty inside these facilities offers a window into modifiable gaps—staffing ratios, rehabilitation access, social-engagement opportunities—that could be corrected at relatively low cost. Equally important is understanding psychological mediators such as fear of falling, because they fuel the downward spiral from muscle weakness to inactivity to further weakness. Mumbai's satellite cities, Kalyan and Dombivli, illustrate the challenge. A rapid rise in private and charitable homes has outpaced evidence-based staffing norms. Residents arrive with multiple morbidities, loose family ties, and patchy physiotherapy services. Yet no study has quantified frailty prevalence or explored its drivers in this specific milieu. Knowing these numbers will sharpen triage, shape targeted interventions, and guide workforce planning. We therefore set out to (i) estimate frailty prevalence using the EFS in institutionalised elders in Kalyan-Dombivli and (ii) test its association with sociodemographic factors, common chronic diseases, assistive-device use, falls, and concern about falling. We hypothesised that frailty would be common (> 60 %) and linked to higher age, multimorbidity, and fear of falls.

MATERIALS AND METHODS

Study design and setting – This was a descriptive cross-sectional analysis nested within a registered PhD trial (CTRI/2023/11/059476). Data were collected in two old-age homes—one charitable, one fee-charging—between 1 August and 15 December 2024.

Participants – Inclusion criteria were age ≥ 60 years, ability to ambulate with or without aids, Mini-Mental State Examination ≥ 24, and informed consent. Residents admitted for respite or hospitalised during data collection were excluded. Purposive sampling yielded 250 volunteers; complete data were available for 248.

Sample-size justification – Using OpenEpi v3 with p = 0.5, d = 0.05, 95 % confidence, and design effect = 0.584 for non-probability sampling, the minimum was 225; allowing 10 % attrition, the target was 248.

Data collection instruments

- Sociodemographic and clinical questionnaire – age, sex, education, length of stay, comorbidities, medications, assistive-device use, type of home, falls in the preceding year.
- Edmonton Frail Scale (EFS)– 11 items, score 0–17; categorised as non-frail (≤ 5), vulnerable (6–7), mild (8–9), moderate (10–11), severe (≥ 12).
- Falls Efficacy Scale-International (FES-I)– 16 items, score 16–64; interpreted as low (16–19), moderate (20–27), high concern (28–64).

Statistical analysis – Data were analysed with SPSS v29. Categorical variables are reported as n (%); continuous variables as mean ± SD. Frailty status (frail vs non-frail) was compared with categorical predictors using χ^2 tests. Continuous predictors were explored with Spearman's ρ. Significance was set at $p < 0.05$ (two-tailed).

Ethics – The institutional ethics committee approved the protocol (IEC No. DYP/IECBH/2023/067). Written informed consent was obtained from all participants.

RESULTS

Mean age was 73.13 ± 6.18 years (range 60–92); half were female (50.4 %). Most had primary or no formal education (50.4 %), and the average stay in the facility was 6.6 ± 2.9 years. Hypertension (56 %) and diabetes (52.8 %) were the commonest comorbidities. Three-quarters (75 %) had fallen at least once in the past year; 59 % used a mobility aid. The overall mean EFS score was 8.71 ± 2.04. A total of 179 residents (72.18 %) were classified as frail: 38.7 % mild, 25.4 % moderate, and 8.1 % severe (Figure 1; Table 2). Only 4.4 % were robust, while 23.4 % were vulnerable. Chi-square tests revealed no association between frailty and gender, hypertension, diabetes, cataract, hearing loss, nephropathy, gastrointestinal or cardiorespiratory disease, assistive-device use, fall history, or type of home (all $p > 0.05$, Table 3). Concern about falling (FES-I categories) approached significance ($\chi^2 = 5.81$, $p = 0.055$). Age, BMI, length of stay, and number of falls showed no significant correlation with EFS score ($\rho = 0.017$–0.03, $p > 0.6$). By

contrast, FES-I score correlated weakly but significantly with frailty (ρ = 0.142, p = 0.025; Figure 2, Table 4).

Table 1. Baseline characteristics of participants (n = 248)

Variable	Category	n (%)	Mean ± SD
Age (years)	Overall	–	**73.13 ± 6.18**
	Male	123 (49.6)	73.39 ± 6.11
	Female	125 (50.4)	72.86 ± 6.26
BMI (kg m^{-2})	–	–	**24.45 ± 4.02**
Education	Uneducated	36 (14.5)	–
	Primary	89 (35.9)	–
	Secondary	67 (27.0)	–
	Higher	56 (22.6)	–
Assistive device use	Yes	146 (58.9)	–
Falls in past year	≥ 1 fall	186 (75.0)	–

Table 2. Distribution of frailty by Edmonton Frail Scale

Category	Score range	n (%)
Robust	0–3	11 (4.4)
Vulnerable	4–5	58 (23.4)
Mild frailty	6–7	96 (38.7)
Moderate frailty	8–9	63 (25.4)
Severe frailty	≥ 10	20 (8.1)

Table 3. Association between frailty and categorical variables

Variable	χ^2	p
Gender	0.131	0.717
Hypertension	1.146	0.284
Diabetes	0.995	0.319
Assistive device use	1.457	0.227
Fall history	0.239	0.625
FES-I category	5.807	0.055

Table 4. Correlation between frailty score and continuous variables

Variable	Spearman's ρ	p
Age	0.017	0.787
BMI	0.030	0.640
Years in home	0.028	0.662
Number of falls	0.030	0.640
FES-I score	**0.142**	**0.025**

Figure 1. Prevalence of frailty categories among residents

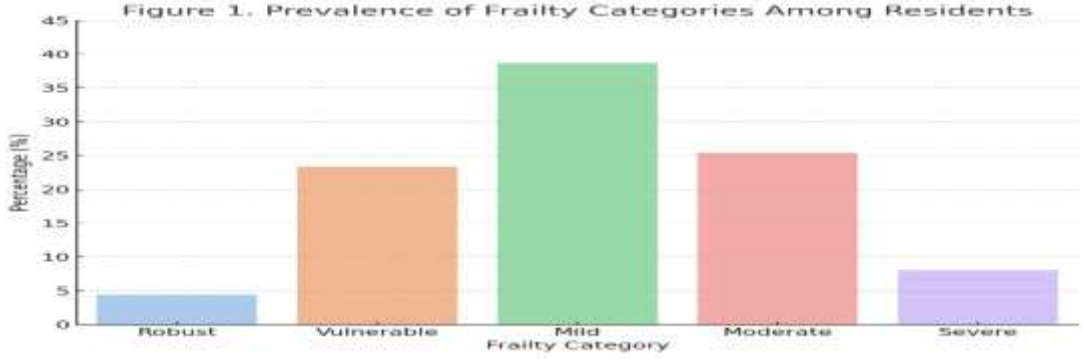
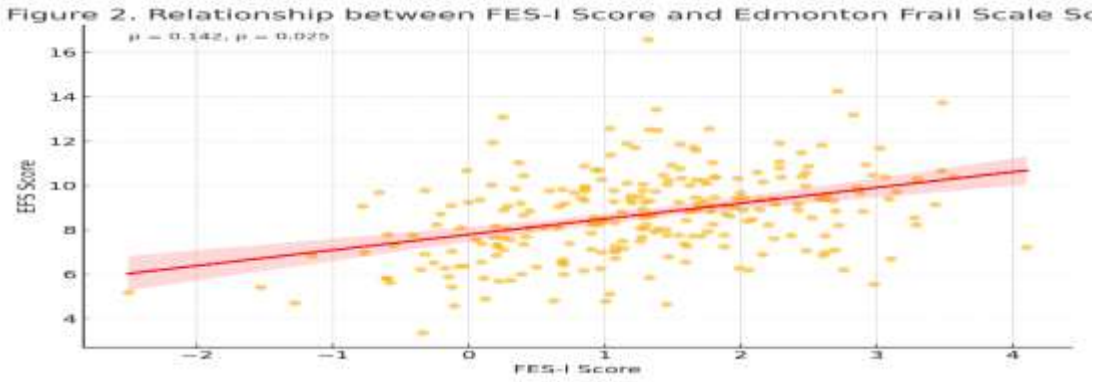


Figure 2. Relationship between FES-I score and Edmonton Frail Scale score



DISCUSSION

What this really means is that frailty is endemic in Indian care-home residents, affecting nearly three-quarters of those we studied—higher than the national community average of ~42 % reported by Singhal et al. [9] but comparable to Brazilian [10] and Italian [11] data from similar settings. The dominance of mild and moderate categories echoes findings from Turkey [12], suggesting a critical window where reversal is plausible. Surprisingly, classic drivers such as advanced age, female sex, and multimorbidity did not predict frailty here. A Nepalese study likewise found age lost significance once living environment was considered [13], supporting the notion that institutional stressors—shared facilities, rigid routines, limited autonomy—may overshadow biological ageing. Our null association between frailty and comorbid diseases aligns with the Rotterdam cohort, which showed frailty to predict adverse outcomes independently of disease count [14]. Resilience may buffer the functional impact of illness [15]; conversely, psychosocial factors like loneliness could accelerate decline despite relatively benign medical profiles. Fear of falling emerged as the only independent signal, albeit weak. This mirrors meta-analytic evidence linking frailty with fall-related anxiety [16]. High concern fosters activity curtailment, muscle atrophy, and social withdrawal—hallmarks of the frailty cycle. Interventions that combine strength-balance training with confidence-building have reversed frailty in community trials [17] and warrant testing in care-home settings. Our prevalence exceeds the 34–50 % range reported from tertiary clinics in North India [18], likely reflecting selection bias towards fitter outpatients in hospital studies. Context matters: residents in our homes lacked family guardianship, a factor tied to frailty in rural Bengaluru [19]. Limitations include the cross-sectional design, purposive sampling, and reliance on self-reported falls. The EFS, while comprehensive, may misclassify sarcopenic but cognitively intact individuals. Longitudinal work should track transitions between frailty states and explore mediators such as nutrition, physical activity, and social engagement. Even so, the message is clear: screening must become routine, and fear-focused rehabilitation deserves priority. Staffing models should allocate physiotherapy and counselling resources proportionate to the frailty burden, rather than to bed numbers alone.

CONCLUSION

Frailty affects more than seven in ten institutionalized elders in Kalyan-Dombivli. Contrary to expectation, age, sex, and common chronic diseases were not reliable markers; instead, fear of falling showed the strongest—though modest—link to frailty severity. Embedding rapid frailty and FES-I screening into admission protocols, followed by tailored strength-balance and confidence-building programmes, could arrest or reverse decline. Policymakers should prioritise funding for such interventions in residential facilities, shifting the focus from disease management to functional resilience.

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