ORIGINAL ARTICLE

Intrinsic capacity screening among elderly using WHO ICOPE tool in rural hilly setting of Garhwal Uttarakhand

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ABSTRACT

Background: Intrinsic capacity combines physical and mental capacities of person and decline with ageing process. WHO Integrated Care for Older People (ICOPE) guidelines have given simple screening tool to assess intrinsic capacity of elderly people, focusing on integrated care in various domains of ageing including locomotion capacity, vitality, sensory abilities, cognition, and psychological capacity. **Objective:** To screen intrinsic capacity among elderly using step 1 WHO ICOPE tool. **Settings and Design:** Cross sectional, community-based study. **Methods and Material:** Intrinsic capacity across domains including locomotion, vitality, cognition, hearing, vision and psychological wellbeing, was assessed among 260 elderly age 60 years and above in 10 villages, using step 1 WHO ICOPE screening tool. Analysis of data was done with SPSS v.27. **Results:** Good intrinsic capacity was found among 122 (46.9%) elderly in all domains. Elderly in 60-69 years age category were 18.7 times more probable to have good IC in comparison to 80 years and above. Also, illiteracy, widowhood and living alone were significantly associated with poor intrinsic capacity. Overall good IC in various domains was not significantly associated with gender. Only in cognitive domain intrinsic capacity was significantly better among male elderly. **Conclusions:** More than half of study elderly had decline in intrinsic capacity in different domains and age is important predictor for decline in intrinsic capacity.

KEYWORDS

Intrinsic Capacity, Elderly, ICOPE, Integrated Care

INTRODUCTION

Inevitable ageing of population resulting in increased geriatric population worldwide, is making it necessary to ensure healthy ageing. Addressing this, the "United Nations" avowed 2021-2030 as the "Decade of Healthy Ageing" with the global vision of long and healthy life of all.(1) It is expected that by the year 2030, 1 in 6 people globally will be above 60 years of age, reaching to 1.4 billion, and by 2050, elderly population is expected to reach 2.1 billion, approximately double of now, with maximum proportion residing in low-and middle-income countries. In addition to this, 80 years and above population is anticipated to reach 426 million by the year 2050, which is three times as of 2020.(2-5) Revelations from "Longitudinal Ageing Study in India (LASI)" predicts 319 million elderly people in India by 2050.(6) Talking of Uttarakhand, of the total population, 11% are elderly people and is classified as a Relatively Aged state with a ranking of 2 among states in India with overall good performance on quality of life index with good score of 59.47.(7,8) However demographic transition of elderly population is more marked in scenic uneven hilly terrain of Garhwal region of Uttarakhand, due to distinct challenges as well as opportunities related to its unique geographic, climatic, socioeconomic, migration, cultural and healthcare context, that profoundly affect quality of life and capacities of elderly people.

Healthy ageing emphases on developing and sustaining the physical and psychological capacities of elderly individuals necessary for well-being in later life. This intrinsic capacity interacting with environment deteriorates with senile progression, and can be preserved by simple and consistent interventions like maintaining a healthy diet, engaging in physical activity and other measures. (1,4) For this, World Health Organisation (WHO) recommended "Integrated Care for Older People (ICOPE)" approach to provide integrated care for a range of age-related conditions such as cognitive loss, sensory impairments, psychiatric problems, nutritional status, and physical capacity.(3,4) These conditions can be assessed with simple innovative WHO ICOPE tool in five different steps with initial Step 1 for screening elderly for possible declines in various domains of ageing including locomotive capacity,

nutritional status, sensory disabilities, cognition, and psychological issues, by using specific assessment methods, followed by other steps with in-depth assessment of deficits and then developing person centred care plan considering comorbidities, environmental and social needs, with the support for caregivers and communities.(3,4)

Objective: To screen intrinsic capacity among elderly using step 1 WHO ICOPE tool in rural hilly area of Garhwal Uttarakhand.

Material & Methods

This cross-sectional study was done among elderly individuals (≥ 60 years age) residing in the hilly rural area, Kirti Nagar with 10 villages, namely Dang, Devli, Maletha, Rampur, Naithana, Ghildiyal Gaon, Kirtinagar, Jakhni, Juyalgarh, Ranihaat with total population of 5900 in the year 2023. Sample size was calculated using national prevalence of loneliness among elderly of 18%, in formula $4pq/L^2$ and 5% absolute error.(8) Final sample size with consideration of non-response as 10%, calculated as 260.(9) All elderly people (≥ 60 years age) who gave a written informed consent and are permanent residents of study area were included in study. Exclusion criteria included refusal to give consent, have severe morbidities and terminally ill. Institutional Ethics Committee (MC/IEC/2022-23/83) approved the study. Period of study was from July 2023 to June 2025, and covered all elderly people in study area satisfying inclusion criteria. Predesigned, pre-tested questionnaire covering socio-demographic information, WHO ICOPE screening questions with interview and brief examination schedule, was used for data collection.

According to step 1 of WHO ICOPE tool, if elderly person was able to do chair rise not using arms for five times in 14 seconds, then intrinsic capacity is good in locomotion domain. Decline in vitality domain was present if elderly person had "appetite loss" or "unintentional weight loss of >3 kg in previous 3 months". Vision assessment was done using "WHOeyes app" mobile application, that checks distant and near visual acuity using tumbling E chart. Mobile phone is held at chest height with screen facing the elderly participant (using distant glasses if participant uses them) at 2 metres distance from participant, with maximized phone brightness in well-lit area and covering one eye while testing for other. Similarly, near vision was tested from 40 centimetres distance with both eyes kept open. (3,10)

Hearing assessment using Whisper test was done by standing one arm distance backside of elderly person, while another ear (not being tested) is covered by pressing tragus with one finger by elderly person, and then whisper three unrelated familiar words. Other ear tested in similar manner. Good hearing capacity was present if elderly person replies three words one by one correctly for both ears.(3) Cognitive decline was present if elderly person gives incorrect response to time and place orientation or, is unable to "recall three words". Poor intrinsic capacity in psychological domain was present if the elderly person has "felt down, depressed or hopeless," or had "little interest or pleasure in doing things" during the previous 2 weeks.(3)

Intrinsic capacity was given score of either 0 or 1 respectively corresponding to poor and good in all the domains, and the final IC (intrinsic capacity) score was sum of scores in each domain and, ranged from 0 to 6, with a higher score representing better intrinsic capacity.(11) Score of 6 is measured as good intrinsic capacity for elderly person. Operational definitions used for collecting data on sociodemographic variables including head of family, illiterate, living status, and financial dependency, are hereby mentioned. Elderly person was considered as head of family if he/she is responsible for making important decisions on behalf of family taking topmost responsibility for managing household matters. Elderly person with no formal schooling and not able to read or write in anyone language with understanding, was considered as illiterate. Living alone status was given to the elderly person residing in a household where he/she is sole resident, due to various circumstances, including widowhood, never having married or divorce, spouse/children residing at different place. Financially dependent was the elderly person stating that he/she was dependent on caregiver for financial support for essential needs like food, housing, healthcare, and not receiving any pension.

Data was analysed with help of SPSS version 27. Intrinsic capacity among male and female elderly were compared using Chi square test. Different sociodemographic predictors for good intrinsic capacity analysed using binary and multiple logistic regression. Nagelkerke R-squared value of 44% (0.44) was found in logistic regression model which shows moderate to strong relationship between sociodemographic variables and overall good intrinsic capacity.

Results

Of 260 study elderly, 148 (57%) were females and 112 (43%) were males. According to age categories, 178 (68.5%) were between age 60-69 years, 59 (22.7%) between 70-79 years and 23 (8.8%) were 80 years and above. Majority of study elderly, 258 (99.2%) were Hindu by religion and only 2 (0.8%) were Sikh. Homemakers form the major proportion, 140 (53.8%), 30 (11.5%) were currently employed, and 90 (34.6%) were either retired from job or, currently unemployed. Most of elderly females are homemakers. Males are either retired or self-employed. Of 260, 90 (34.6%) are illiterate, 53 (20.4%) are educated up to high school, 40 (15.4%) are graduates, 28 (10.8%), 24 (9.2%), 15 (5.8%) and 10 (3.8%) are educated up to middle, primary, postgraduate, and intermediate level respectively. Also, the level of education was significantly associated with gender. Out of all females 81 (54.7%) were illiterate, while out of all males only 9 (8%) were illiterate. Talking about higher education, only 11 (7.4%) females were graduates and only 1 (0.7%) was postgraduate. As classified according to Modified BG Prasad's scale, total 212 (81.5%) participants belonged to upper class, 36 (13.8%) to upper middle and 12 (4.6%) to lower middle class. None of study elderly were in socioeconomic Class III and V. Of 260 study elderly, 171 (65.8%) are married and 89 (34.2%) are widows/widowers. Living status includes 137 (52.7%) elderly living with their children/relative along with their

spouse, 74 (28.5%) live with children without spouse, 33 (12.7%) live only with their spouse and 16 (6.2%) live alone. 159 (61.2%) were head of their family themselves, of which 52 (32.7%) were females and 107 (67.3%) were males. Of 260 elderly 121 (46.5%) were financially independent, of which 36 (29.8%) were females and 85 (70.2%) were males. financial dependency was found to be statistically significant with gender (Table 1).

In our study, locomotion capacity decline is found in 36.5% elderly, impaired vision in 40.8%, hearing impairment in 15.4%, vitality decline in 6.2%, cognitive decline in 2.3% and psychological capacity decline in 5.8%. Among elderly females, 61 (41.2%) had decline in locomotor domain, compared to 34 (30.4%) among elderly males, with no significant gender difference (p=0.072). Unintentional weight loss (>3 kgs in last 3 months) was found in 24 (9.2%) elderly, including 14 females and 10 males, and appetite loss was reported by 19 (7.3%) elderly, including 12 females and 7 males, with no statistically significant difference. Vision and hearing impairments also had no statistically significant association with gender. In cognitive domain, 7 (2.7%) of elderly were not oriented to time and place, and 21 (8.1%) of elderly could not recall three words. Three words recall and gender were statistically significant on application of chi square test (p=0.005). Feeling down or depressed or hopeless, over past two weeks was stated by 18 (6.9%) of elderly were, including 7 females and 11 males. Gender has no statistically significant association with intrinsic capacity in psychological domain (Table 2).

In 60-69 years, 84.83% elderly had good locomotion capacity, while only 20.33% and 8.69% respectively in 70-79 years and, ≥80 years age groups. Good vision and hearing were respectively found in 73.03% and 96.06% elderly of 60-69 years. Whereas between 70-79 years, 35.39% had good vision and 69.49% had good hearing. Among elderly with age ≥80 years, 13.04% and 34.78% had good vision and hearing respectively. Talking about cognition and vitality again a decline in percentage of elderly with good cognition was seen as the age group increased. Also, 97.2% of elderly between age 60-69 years had good intrinsic capacity in psychological domain (Figure 1).

Good Intrinsic Capacity was score of 6 (good in all domains), found in 122 (46.9%) study elderly. On bivariate analysis, elderly in 60-69 years age category were 18.7 times better intrinsic capacity than ≥80 years elderly. Also, literate, and married elderly had approximately five times better intrinsic capacity than illiterate and widows/widowers respectively. Among homemakers 43.6% had good intrinsic capacity in all domains and overall employment has statistically significant association with good intrinsic capacity (p=0.013). Using multiple logistic regression age, literacy and marital status were significant predictors of good intrinsic capacity (Table 3). According to living status, intrinsic capacity was best among elderly living with spouse and children/relative, and they are 4.9 times more likely to have good IC compared to elderly living alone. Comparing mean IC scores using Anova test among living status categories shows scores are highest among elderly living with spouse and children/relative (5.38±0.96), and lowest among elderly living alone (4.06±1.56) (p<0.001) (Figure 2).

Table 1: Distribution of study elderly according to sociodemographic characteristics (N=260)

Sociodemographic Variables	No. of elderly (%)
Gender	
Females	148 (57)
Males	112 (43)
Age groups	
60-69 years	178 (68)
70-79 years	59 (23)
≥80 years	23 (9)
Education	
Illiterate	90 (34.6)
Primary	24 (9.2)
Middle	28 (10.8)
High-school	53 (20.4)
Intermediate	10 (3.8)
Graduate	40 (15.4)
Postgraduate	15 (5.8)
Marital Status	
Married	171 (65.8)
Widow/Widower	89 (34.2)
Living Status	
Living Alone	16 (6.2)
With spouse	33 (12.7)
Children/Relative with spouse	137 (52.7)
Children/Relative without spouse	74 (28.5)
Socio-economic Status	
Upper (Class I)	214 (82.3)
Upper Middle (Class II)	34 (13.1)
Middle (Class III)	0
Lower Middle (Class IV)	12 (4.6)
Lower (Class V)	0
Financial Dependency	
Dependent	139 (53.5)
Independent	121 (46.5)
Employment status	
Currently Employed	30 (11.5)
Homemakers	140 (53.8)
Retired/Currently Not Employed	90 (34.6)
Head of Family	
Yes	159 (61.2)
No	101 (38.8)

Table 2: Intrinsic capacity (IC) in different domains among male and female elderly (N=260)

Domain	Good IC	Poor IC	Total	P value*
Locomotor Domain				
Chair-rise test: Did the person complete 5 chair rises within 14 seconds?				
Female	87 (58.8)	61 (41.2)	148	
Male	78 (69.6)	34 (30.4)	112	0.072
Total	165 (63.5)	95 (36.5)	260	

Domain	Good IC	Poor IC	Total	P value*
Vitality Domain				
Weight Loss (>3 kgs in last 3 months, unintentional)				
Female	134 (90.5)	14 (9.5)	148	
Male	102 (91.1)	10 (8.9)	112	0.884
Total	236 (90.8)	24 (9.2)	260	
Appetite Loss				
Female	136 (91.9)	12 (8.1)	148	
Male	105 (93.8)	7 (6.2)	112	0.569
Total	241 (92.7)	19 (7.3)	260	
Sensory Domain				
Vision				
Female	86 (58.1)	62 (41.9)	148	
Male	68 (60.7)	44 (39.3)	112	0.672
Total	154 (59.2)	106 (40.8)	260	
Hearing (Whisper test)				
Female	121 (81.8)	27 (18.2)	148	
Male	99 (88.4)	13 (11.6)	112	0.142
Total	220 (84.6)	40 (15.4)	260	
Cognitive Domain				
Orientation in time and space				
Female	143 (96.6)	5 (3.4)	148	
Male	110 (98.2)	2 (1.8)	112	0.432
Total	253 (97.3)	7 (2.7)	260	
Recall three words				
Female	130 (87.8)	18 (12.2)	148	
Male	109 (97.3)	3 (2.7)	112	0.005
Total	239 (91.9)	21 (8.1)	260	
Psychological Domain				
Over past two weeks:				
Feeling down or depressed or hopeless				
Female	141 (95.3)	7 (4.7)	148	
Male	101 (90.2)	11 (9.8)	112	0.109
Total	242 (93.1)	18 (6.9)	260	
Over past two weeks: Little interest or pleasure in doing things				
Female	133 (89.9)	15 (10.1)	148	
Male	97 (86.6)	15 (13.4)	112	0.416
Total	230 (88.5)	30 (11.5)	260	

**Chi Square test*

Table 3: Association of good intrinsic capacity with socio-demographic factors (N=260)

Variables	Good IC score in all domains (n=122) Row%	Crude OR (CI) P value	Adjusted OR (CI)	P value*
Age groups				
60-69 years	114 (64.0%)	18.70 (4.24-82.35)	5.32 (1.08-26.16)	0.039
70-79 years	6 (10.2%)	1.18 (0.22-6.36)	0.67 (0.11-3.94)	0.661
≥80 years	2 (8.7%)	1ref	1ref	
		<0.001		**<0.001**
Gender				
Females	70 (47.3%)	1.03 (0.63-1.69)	3.34 (0.72-15.38)	0.122
Males	52 (46.4%)	1ref	1ref	
		0.889		
Literacy				
Illiterate	19 (21.3%)	1ref	1ref	
Literate	103 (60.2%)	5.74 (3.17-10.38)	3.03 (1.24-7.36)	**0.014**
		<0.001		
Marital Status				
Married	103 (60.2%)	5.58 (3.08-10.09)	5.27 (1.81-15.4)	**0.002**
Widow/Widower	19 (21.3%)	1ref	1ref	
		<0.001		
Living Status				

Living Alone	4 (25.0%)	1ref	-	
With spouse only	17 (51.5%)	3.18 (0.85-11.95)		
Children/Relative with spouse	85 (62.0%)	4.90 (1.50-16.00)		
Children/Relative without spouse	16 (21.6%)	0.82 (0.23-2.91)		
		<0.001		
Socio-economic Status				
Upper (Class I)	110 (51.4%)	5.28 (1.13-24.71)	1.44 (0.21-9.85)	0.708
Upper Middle (Class II)	10 (29.4%)	2.08 (0.38-11.26)	0.82 (0.98-6.93)	0.858
Lower Middle (Class IV)	2 (16.7%)	1ref	1ref	
		0.009		0.543
Financial Dependency				
Dependent	63 (45.3%)	1ref	1ref	
Independent	59 (48.8%)	1.14 (0.70-1.87)	0.62 (0.25-1.55)	0.311
		0.580		
Head of Family				
Yes	71 (44.7%)	0.79 (0.48-1.30)	2.19 (0.70-6.83)	
No	51 (50.5%)	1ref	1ref	0.175
		0.358		
Employment status				
Currently Employed	22 (73.3%)	3.59 (1.44-8.93)	2.68 (0.94-7.68)	0.065
Homemakers	61 (43.6%)	1.01 (0.59-1.72)	1.52 (0.30-7.67)	0.609
Retired/Not Employed	39 (43.3%)	1ref	1ref	
		0.013		0.182

**Adjusted using multiple logistic regression*

Figure 1: Intrinsic Capacity with increasing age across different domains (N=260)

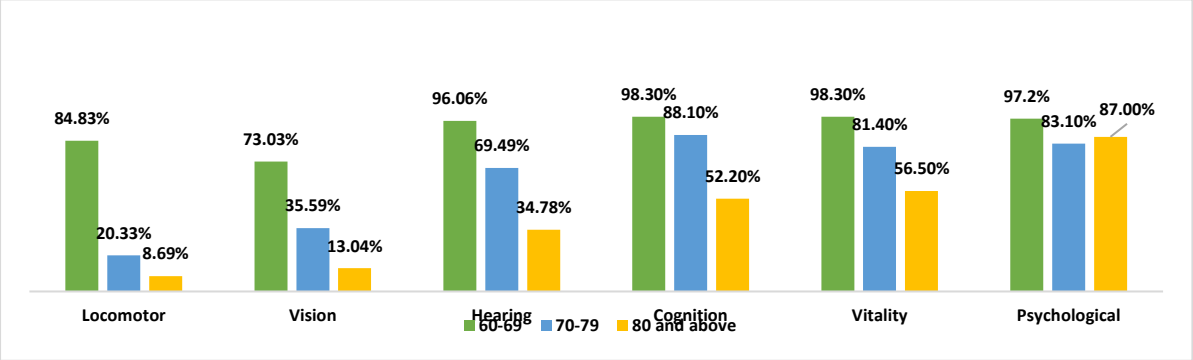
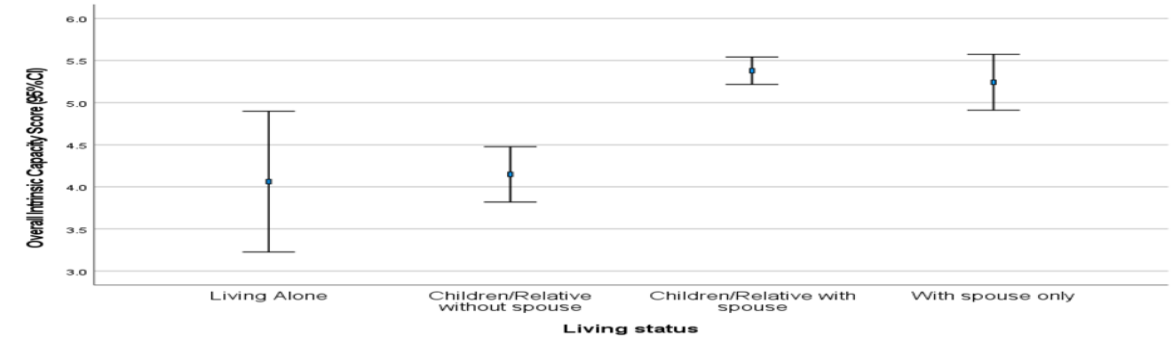


Figure 2: Error bar showing intrinsic capacity scores according to living status (N=260)



DISCUSSION

Nowadays most of individuals globally can anticipate to survive beyond sixty years of age and therefore intrinsic capacity needs to be well-maintained with ageing. For healthy ageing, WHO focuses on integrated care for older people and enhancing capacities in various domains of ageing including sensory abilities, vitality, locomotion, cognition, and psychological capacities. Assessment of these domains is done with simple WHO ICOPE tool in stepwise manner. Detailed assessment is needed in the domain with the deficit. This is therefore an innovative approach for primary care of elderly people in community and therefore promotes healthy ageing. This tool is created to be applied in five different steps with initial Step 1 for screening participants for possible declines in different domains, followed by other steps with thorough assessment of deficits and then preparing person centred management considering comorbidities, environmental and social needs, with the support for caregivers and communities.(3) WHO also recommends that intrinsic

capacity should be monitored every 6 months, even for elderly with no decline in intrinsic capacity.(12)

Our study results show that 122 (46.9%) of study elderly in rural hilly setting has good intrinsic capacity in all domains. Mathur A et al using same WHO ICOPE tool in rural villages of Jodhpur, Rajasthan showed that cognitive decline was present in 31.5% elderly, mobility was reduced in 52.1% elderly, 49.4% reported eye difficulties, 68.3% reported hearing loss, 17.5% reported recent weight loss and 33.7% reported decreased appetite.(13) These declines are higher than found in our study, where impaired vision in 40.8%, hearing impairment in 15.4%, locomotion capacity decline in 36.5%, vitality decline in 6.2% and cognitive decline in 2.3% and psychological decline in 5.8%. Notable decline in intrinsic capacity with increasing age is the consistent finding of previous studies among elderly, and in our study also, on multivariate analysis, age is found as significant predictor of good intrinsic capacity.(11,14) However in study by Muneera et al, locomotor capacities were not significantly predicted by age and this differs from our study findings, where best intrinsic capacity in locomotion domain was between 60-69 years age category with statistically significant difference in comparison to other age categories.(14) In a study from Rishikesh town of Dehradun district, among elderly with mean age of 67.55±6.73 years, frailty is found in 58.38% using Fried's criteria, and was not associated with increasing age but with gender, as male elderly were comparatively more frail and lower frailty found in people living in hills compared to those living in plains.(15) Our results also align with findings of review of nine worldwide studies using WHO ICOPE tool, by Jayaraj V et al, where pooled prevalence was 55% for overall impairment in intrinsic capacity.(16) Leung AYM et al used WHO ICOPE tool and found that impairments in cognition, locomotion, vitality, hearing and vision, were 25.5%, 39.8%, 2.7%, 27.9% and 24.7% respectively.(17)

Mean IC score in our study is 4.93 ± 1.28, this is better than average IC score of 4.73 ± 1.27 in comparatively younger Chinese sample with 68.65 ± 11.41 years mean age.(18) However, no significant gender difference in good intrinsic capacity has been found in our study, but level of education was significantly higher among males ($p < 0.0001$). While 54.7% females are illiterate, only 8% males are illiterate in our study, and this difference is also found in higher education, as only 7.4% females were graduates compared 25.9% males educated up to graduate level. But literacy and not gender, is found associated significantly with good intrinsic capacity in our study. However, in a scoping review, it is revealed that women have poorer intrinsic capacity.(11) Married elderly have 5.58 times better intrinsic capacity than widows/widowers, and similar association is revealed by other studies. (11,14)

More of elderly females than males, struggled with three words recall test in our study, showing cognitive decline, and this is consistently found in previous studies from India. (19,20) Similarly in a recent study in Gorakhpur, elderly females have significantly higher cognitive decline.(20) However no statistically significant association of psychological capacity with gender is found in our study. This contrasts with findings of Tiwari K et al in Dehradun, where depression was more among older females.(21) Among Japanese elderly, Taniguchi R et al using cohort study design found that decline in instrumental activities of daily living was higher in unemployed elderly with depressive tendency and infrequent participation in social activities.(22) In our study, currently employed elderly are 2.68 times better intrinsic capacity than retired or not employed. Also, among homemakers, 43.6% had good intrinsic capacity in all domains. Besides sociodemographic factors, health related and lifestyle influences like diet, exercise, smoking, alcohol use, ADL, frailty, and multimorbidity, have shown association with intrinsic capacity. (5,11)

Conclusion

Losses in intrinsic capacity are prevalent and an important concern among rural elderly population in hilly region of Uttarakhand, with less than half of participants retaining good capacity across all domains. Deficits were chiefly found in sensory and locomotor domains. Advancing age, illiteracy, widowhood, and living alone are identified as significant factors associated with poor intrinsic capacity. While gender is not the determinant for overall capacity, better cognitive performance found among males. Our study also recommends the WHO ICOPE Step 1 tool as feasible and effective for identifying functional declines among elderly in community settings.

Recommendation

For providing elderly care at primary level, health workers should be trained to use this simple tool to detect declines early, and assess already frail also. Interventions like health camps should specifically screen elderly individuals like widowed, living alone, or aged 80 and above. Provision of sensory and mobility aids should be given priority. As employment and literacy were associated with better intrinsic capacity, creating opportunities for simple post-retirement vocational activities, literacy and cognitive stimulation activities should be encouraged.

Relevance of the Study

This study addresses a critical gap in elderly healthcare specifically in rural hilly areas, finds important factors associated with poor intrinsic capacity, and validates WHO ICOPE Step 1 tool as a feasible means to find decline in intrinsic capacity among elderly.

Authors Contribution

All authors have contributed equally.

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Nil

Conflict of Interest

There are no conflicts of interest.

Declaration of Generative AI and AI Assisted Technologies in the Writing Process

The authors haven't used any generative AI/AI assisted technologies in the writing process.

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