Comparative Study of Three Fall Risk Assessment Scales in Geriatric Patients with and Without Fractures

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Abstract :
Background : *Incidence of falls is 32% to 40% in people aged 65 or more. There is evidence that falls can be reduced. It is important to identify high risk patients for intervention . The objectives of this study were to compare the validity of the three fall risk assessment scales and to recommend the most appropriate fall risk assessment scale for Geriatric patients in Indian subcontinent.*
Materials and Methods : *One hundred geriatric patients were assessed using three fall risk assessment tools : Morse scale , Schmid score , STRATIFY scale . The statistical analysis included calculation of sensitivity , specificity , positive predictive value and negative predictive value of each scale .*
Results : *The fall risk assessment tools currently used for elderly did not show sufficiently high predictive validity for risk stratification. STRATIFY score had highest sensitivity but low specificity .Schmid score showed opposite findings.*
Conclusion : *Rather than using a single measure, two assessment tools used together will maximize the advantage of each other in predicting occurrence of falls .*
Key words: *falls , geriatric, fall prevention, elderly ,*

I. Introduction

Falls are among the most common and serious problems in elderly. They are associated with considerable mortality , morbidity , reduced functioning , institutionalization, hospitalization .Frequently , older people are not aware of their risk of falling . Opportunities for prevention of falling are often overlooked .Both the incidence of falls and the severity of fall related complications increase after age 60 [1].

In the age 65 and over population as a whole, approximately 35% to 40% of community dwelling , generally healthy older persons fall annually . After age 75 , the rate is higher between 2% in General hospitals and 27% in acute hospital Geriatric ward [2] .Fall related injuries were severe and leads to decline in the quality of life of an older person . Around 37% to 56% of all falls lead to minor injuries , while 10% -15% falls cause major injuries .Falls are the leading cause of injury related hospitalization in persons age 65 and older and account for 40% of emergency admissions in 4% of all hospital admissions in this age group [3] . Falls can have various consequences like fractures and headinjuries, as well as postfall anxiety. These can lead todisability and decreased mobility due to fear of falling again. The reductions in mobility and independenceare often serious enough to result in admission tothe hospital or even premature death [4] .Current practice commonly focuses on the injury ,with little emphasis on looking for the cause and preventing falls [2].

Literature shows evidence that falls can be prevented [5] . The most common approach to fall reduction in hospitalsinclude of multifaceted interventions involvingpatient assessment; risk identification; medication review;eliminating environmental factors (e.g. slippery floor, obstacles, etc.); educating patient and relatives , providing physical assistance to high-risk patientsduring activities such as mobilization and self care; andincreasing staff awareness of falls[6] .

The cornerstone of all fall prevention programmes isthe identification of patients at risk of falling. This is mostcommonly performed with the aid of a fall-risk assessment tool [7] .

After fall risk assessment , appropriate measures must be advised to patient.

Interventions with proven benefits for prevention of falls :
Home safety assessment and interventions accordingly [8]
Vitamin D supplementation [9]
The following interventionscan help geriatric patient in preventing falls:
• Review medications, minimizing drugs [8].
•Assess and treat postural hypotension [10]
• Expedite cataract surgery on the first affected eye [8]
•Suggest single-lens distance-vision glasses for outdoor usein multifocal-lens users who participate in regular outdooractivities [11]
• Consider pacing in cardioinhibitory carotid sinusHypersensitivity and recurrent falls [12]
•Recommend multifactorial interventions that assess an individual person's risk of falling, and carry out interventions to reduce that risk [8].

It is important to identify high-risk patients likely to benefit from expensive multidisciplinary interventions.Several fall risk factors have been identified, and some of them have been compiled into fall risk assessment tools. Such tools are based on the assumption that the higher the number of risk factors, the higher the risk of falling. Although a number of tools have been used to identify fall risk , not all have been validated.There is considerable overlap between the characteristics used to compile the tools, and the different scales seem very much similar to each other. A comparative study of three assessment tools was therefore conducted to determine whether there are any differences in these scales. The chosen fall risk tools were the Morse [13], STRATIFY[14], Schmid[15] .By studying them simultaneously, we aimed todeterminewhetherthereareareal differences in effectiveness between fall risk assessment scalesor if the more complex tools are any better than simple tools at identifying Geriatric patients at risk for fall.

II. Material And Methods

Study design : Cross sectional observational study
Source of study population :
Geriatric patients (Aged 60 and above) visiting the Geriatrics OPD and admitted in geriatric and orthopedic ward of Government Medical College and Hospital , Aurangabad
Sample Size: 100 geriatric patients
Inclusion criteria : Age60 and above
Exclusion criteria :
- Patient not willing to participate.
- Fall due to Road Traffic Accidents

After applying inclusion and exclusion criteria and after taking written valid informed consent , participants wereincluded in the study. Data collected using aproforma.

Following Scales were used :
1.   **Morse Scale**

Sr no			
1	History of falling	No 0 Yes 25	
2	Secondary diagnosis	No 0 Yes 25	
3	Ambulatory aid Bed rest/nurse assist Crutches cane/walker Furniture	0 15 30	
4	IV Heparin lock/saline	No 0 Yes 20	
5	Gait/transfer Normal /bedrest/immobile Weak Impaired	0 10 20	
6	Mental status Oriented to own ability Forgets limitations	0 15	

2.   Schmid Scale

Mobility no gait disturbance/unable to ambulate ambulates with assistive devices/with unsteady gait /no assistance	**0** **1**
Mentation alert, oriented periodic confusion,confusion at all time	**0** **1**
Elimination independent in elimination independent with frequency/diarrhea,needs assistance with toileting,incontinence	**0** **1**
Prior fall history in past 6 months yes before admission during this admission no, unknown	**1** **2** **0**
Current Medications **1 (On Antihypertensive/OHA/Anticonvulsants)**	**1/0**
2 or less- no risk , 3 or more- at risk	

3.   STRATIFY Score

	Question	**No /yes**
1	**Recent history of fall ?**	**0/1**
2.	**Is the patient agitated ?**	**0/1**
3.	**Is the patient visually impaired to the extent that everyday function is affected ?**	**0/1**
4.	**Is the patient in need of especially frequent toileting ?**	**0/1**
5.	**Does the patient have a combined transfer and mobility score of 3 or 4 ?** Transfer score : choose one of the following options which best describes patient's level of capability when transferring from bed to chair: 0=unable, 1=needs major help, 2= uses walking aid or help of one person , 3= independent Mobility Score : Choose one of the following which best describes patient's level of mobility 0=immobile, 1=independent with aid of a wheelchair,3=independent Combined score (transfer + mobility) =	**0/1**
	0-low risk , 1-Moderate risk, 2-high risk	

III.   Result

Majority of patients with falls belonged to age group of 70-74 years 9 (Chart 1).Whereas in those without falls most males were in age group of 65-69 years and females between 60 to 64 years.(Chart 2) .Slip on wet floor was present in 21 percent patients as a cause of fall , followed by rush, giddiness, fall from bed , alcohol and gait problems .(Chart 3) .Comorbidities were highly prevalent followed by drugs , gait disturbances , environmental hazards etc as a risk factor among population studied .(Chart 4) .

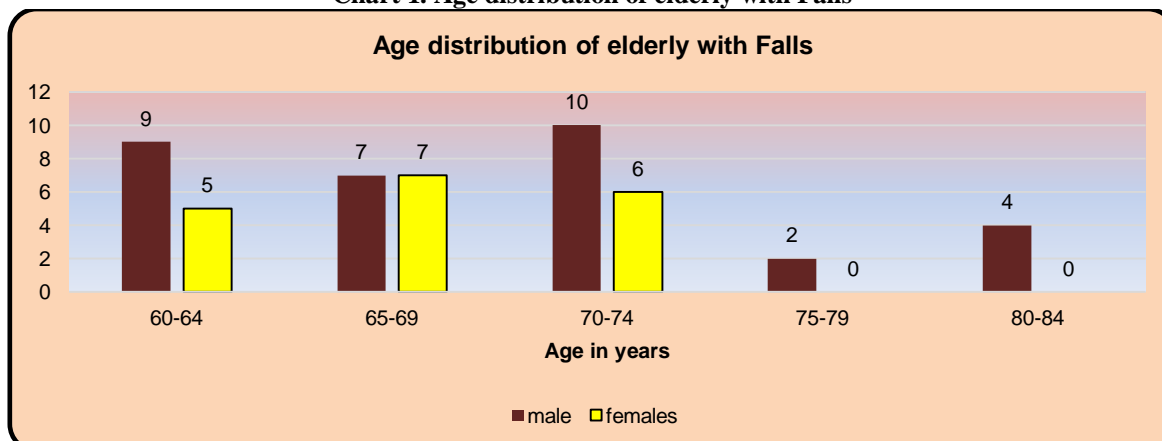**Chart 1. Age distribution of elderly with Falls**

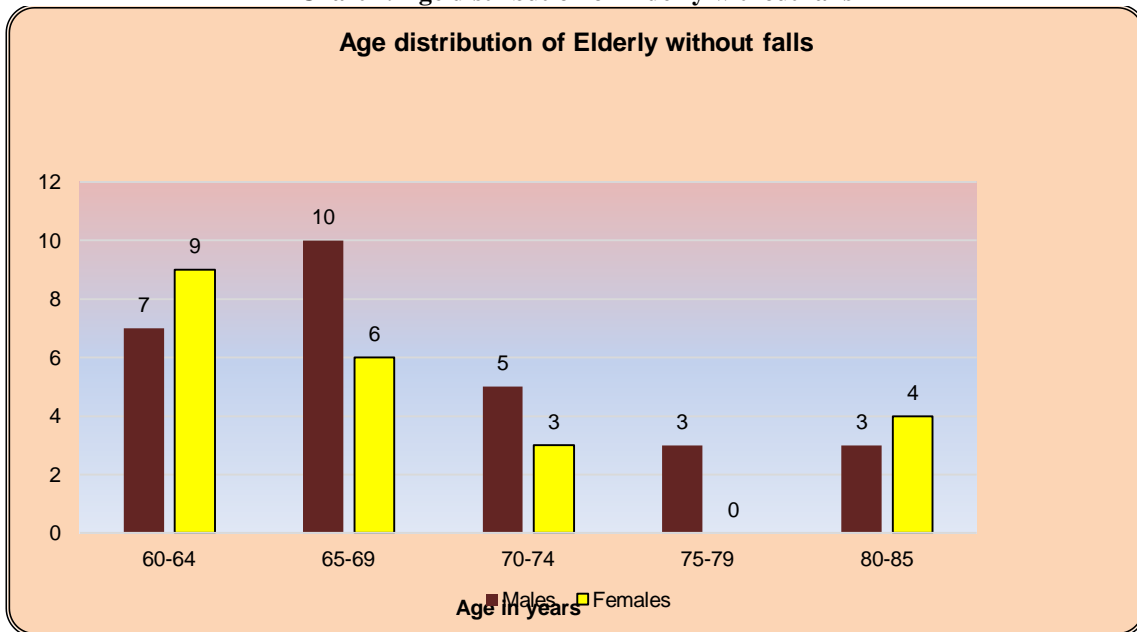**Chart 2. Age distribution of Elderly without falls**

Age distribution of Elderly without falls

Age in years — Males □ Females

Chart 3. Causes of Fall

Causes of Fall
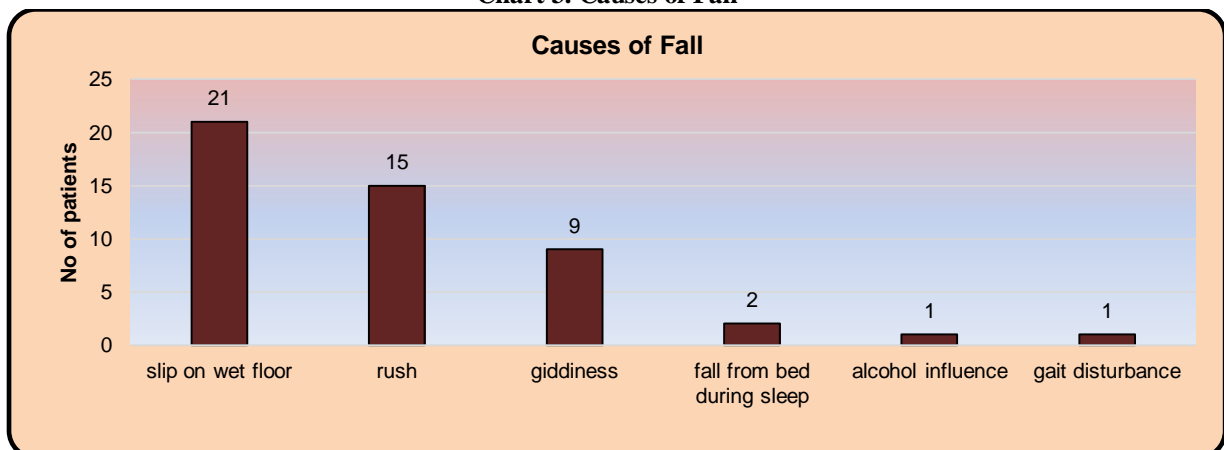

Chart 4. Risk factors identified overall

Table 4 ;Risk factors identified overall

Chart 5. Risk Stratification of Elderly with Fractures

Table 5 :Risk Stratification of Elderly with Fractures
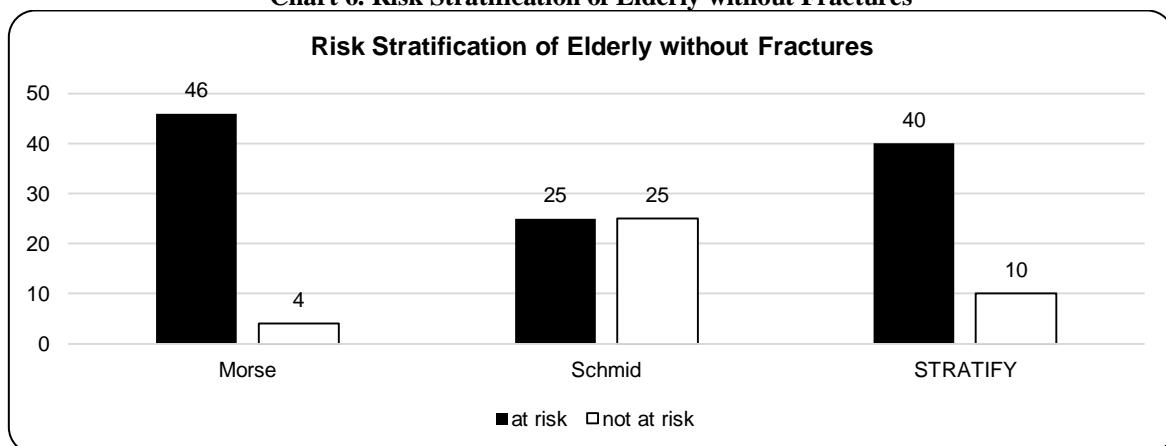
	Morse		Schmid		STRATIFY	
at risk	37		17		50	
not at risk		13		33		0

■ at risk □ not at risk
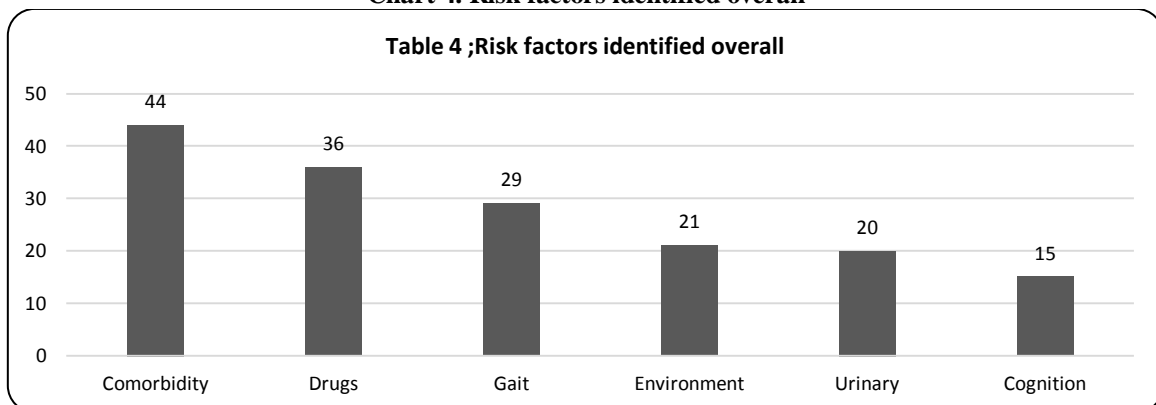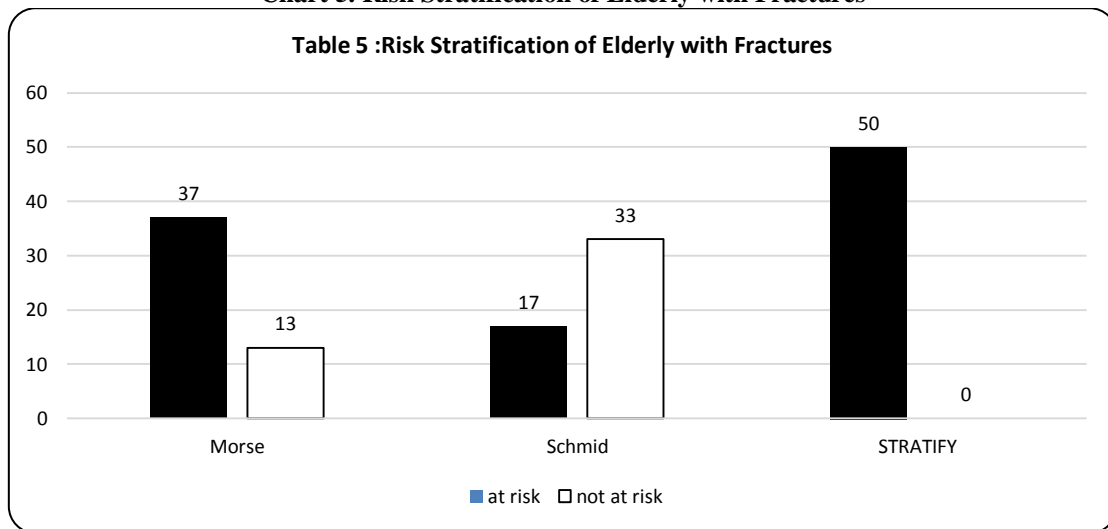
Chart 6. Risk Stratification of Elderly without Fractures

Risk Stratification of Elderly without Fractures

	Morse		Schmid		STRATIFY	
at risk	46		25		40	
not at risk		4		25		10

■ at risk □ not at risk

Table 7 : STATISTICAL ANALYSIS

	Morse Scale	STRATIFY SCORE	SCHMIDS Scale
Sensitivity	74	100	34
Specificity	8	20	50
Positive Predictive Value	44.58	55.55	40.48
Negative Predictive Value	23.53	100	43.1

The performance of various tools has been shown in Table 7. STRATIFY score had the highest sensitivity of 100 percent but low specificityie 20 percent. Morse scale had Sensitivity of 74 percent and specificity of 8 percent . Schimids score had results opposite of them with 34 percent sensitivity and 50 percent specificity. The positive predictive values of the three scales were Morse(44.58%) , STRATIFY (55.55%), Schmid Scale(40.48%) .

IV. Discussion

Fall is one of the adverse events that occurs mostoften in elderly; it is very important to identify patients with a high risk of falling in order to prevent fall

events. Numerous fall risk assessment scales have beendeveloped to identify patients with a risk offalling, and thus it is important to identify which is themost easily applicable and appropriate fall risk assessment scale with a high validity value for them.This study first selected three tools. In order to suggest the fall risk assessment scale that best suited , four validitycriteria were used, sensitivity, specificity, and positiveand negative predictive values, which are widely usedindices for diagnostic tests or accuracy and

validityinterpretation of assessment scales [16].

The sensitivity is the ratio of people who are expected to fall according tothe tool score of patients who had fall incidents, and specificity is the ratio of people who are expectednot to fall according to the tool score of patients whodid not have fall incidents.

STRATIFY scale had highest sensitivity but low specificity . Schmid scale has shown opposite findings.The fall risk assessment scales used for elderly did not show sufficiently high predictive validity for risk stratification. It is very difficult to develop the best fall riskassessment scale with high predictive power and sensitivity because ofthe complex and complicated medical condition and ambience of geriatric patients.

V.   Conclusion

In order to suggest the most useful fall risk assessment scale with high validity, this study selected three fallrisk assessment scales, the Morse Fall Scale, STRATIFY scale, Schmidscale.The results ofdata analysis showed thatrather than using a single measure, two assessment tools used together will maximize the advantage of each other in predicting occurrence of falls in elderly.Based on the researchresults, we reached to following inferences: (a) additional validity studies applied to various medical environments and patients are needed. (b) It is necessary to develop revised scales which reflect thediverse medical environments and fall risk factors inelderly, and these scales need to be evaluated for validity and reliability.

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