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Hip fracture subtypes, duration of hospital stay and its association with co morbidities

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Abstract : *Hip fractures (neck of femur and trochanteric) are the most common osteoporotic fractures seen in the elderly, contributing to significant degrees of morbidity, mortality and limitations in quality of life. We have evaluated the patterns of hip fracture subtypes and its association to various risk factors. 273 subjects with hip fractures were studied; there was a small increase in proportion of neck fractures in men and trochanteric fractures in women with age, both fractures occurred more commonly in women than men. Trochanteric fractures were associated with long term steroid intake and asthma. Strong association was observed with co morbidities and the total duration of hospital stay, the pre operative and post operative hospital stay. Hence, by addressing the co morbidities that have the greatest impact on hospitalization, we may be able to lower the duration of hospitalization and thereby treatment costs.*

Keywords: *age, Co morbidities, Hip fracture subtypes, hospital stay, neck of femur, trochanteric fracture.*

I. Introduction

Hip fractures (neck of femur and trochanteric) are the most common osteoporotic fractures seen in the elderly and contribute to significant degrees of morbidity, mortality and limitations in quality of life[1]. Hip fractures, of either type are diverse in its etiology and patterns of occurrence[2] left alone the differences in their anatomical structure and bony composition [3]. Graying India with an estimated 227 million of elder population in 2050 will be[4] a challenge for national infrastructures, particularly public health systems ; this poses a huge burden of hip fractures whose risk increases dramatically with age . Many publications have linked various factors such as age & sex [5] , racial differences [6],dietary factors[7],alcohol intake &beverage preference[8], lifestyle & drug intake[9][10], chronic renal disease[11],occupation [12],physical activity [13],rheumatoid arthritis & steroid therapy[14],smoking[15] & chronic illness[16] with the risk of trochanteric fractures and femoral neck fractures . However, the strength of association has not been established in most of the studies .Hence, we have evaluated the association of risk factors with the subtypes of hip fractures. We have further tried to look into the patterns of occurrence of hip fracture subtypes and its association with age and gender

II. Materials and methods

This is a retrospective analysis of data retrieved from the electronic data base of Sree Gokulam Medical college and Research Foundation, Trivandrum in southern India, a state with major epidemiological transition. 273 subjects with hip fractures (fracture neck of femur (ICD 10: S72.0-S72.091) and trochanteric fracture (ICD 10: S72.1-S72.191)) admitted and who had undergone surgical treatment in this institute between 1st January 2011 and 31st July 2014, were evaluated using a structured questionnaire containing the following variables : age ,gender , hip fracture types (NOF/TRO),presence or absence of co-morbidities such as diabetes mellitus, hypertension , renal dysfunction, chronic obstructive pulmonary disease, steroid intake, asthma, coronary artery disease , cerebrovascular accident and epilepsy. The duration of total hospital stay, the pre-operative period and post operative period in the hospital (in days); pre and post operative renal parameters, creatine, urea and sodium were also recorded. The outcomes were not evaluated and patients with malignant neoplasm were excluded from the study

2.1 Statistical Analysis

The distribution of anatomic hip fracture types as a function of age and gender was done after categorizing the participants into five age strata of <50 yrs,50-59 yrs. 60-69yrs, 70-79yrs ,>80 yrs . Hip fracture types by age groups and gender, co morbidities, renal and metabolic parameters was analyzed by Chi-

Square. Non parametric test of Mann Whitney was used for skewed data of duration of hospital stay in days (total hospital stay, the pre-operative period and post operative period) (SPSS for windows version 17) Statistical significance was set at <0.05

III. Results

3.1 Demographic profile

We had 273 cases and the subtypes by sex and age group is given in table 1 and 2 and figure 1 and 2

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Table 1. Hip fracture sub types and gender

Gender	Type of fracture				Total		χ^2 (p)
	Neck of femur		Trochanteric				
	N	%	N	%	N	%	1.534 (0.216)
Male	35	28.9	34	22.4	69	25.3	
Female	86	71.1	118	77.6	204	74.7	
Total	121	100	152	100	273	100	

Table 2. Hip fracture sub types and age distribution

Neck of Femur						
Age	**Male**		**Female**		**Total**	
	N	%	N	%	N	%
<50	4	11.4	3	3.5	7	5.8
50-59	4	11.4	4	4.7	8	6.6
60-69	7	20	17	19.8	24	19.8
70-79	11	31.4	33	38.4	44	36.4
>80	9	25.7	29	33.7	38	31.4
Trochanteric						
Age	**Male**		**Female**		**Total**	
	N	%	N	%	N	%
<50	5	14.7	1	0.8	6	3.9
50-59	7	20.6	2	1.7	9	5.9
60-69	4	11.8	22	18.6	26	17.1
70-79	8	23.5	44	37.3	52	34.2
>80	10	29.4	49	41.5	59	38.8

Figure 1. Fracture neck of femur by gender and age

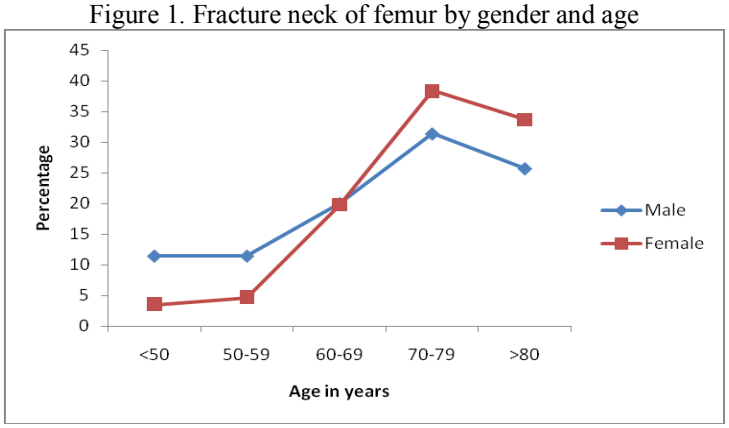
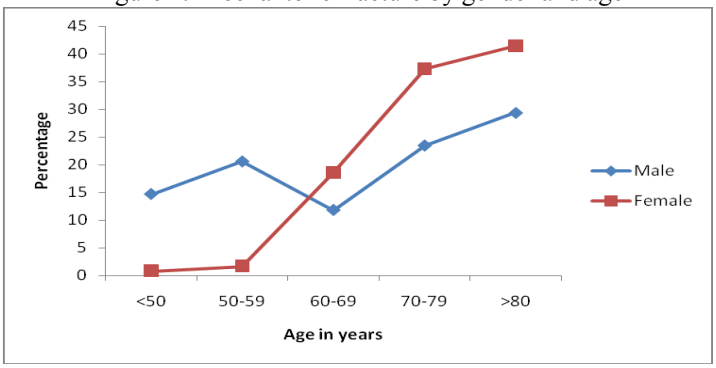


Figure 2. Trochanteric fracture by gender and age



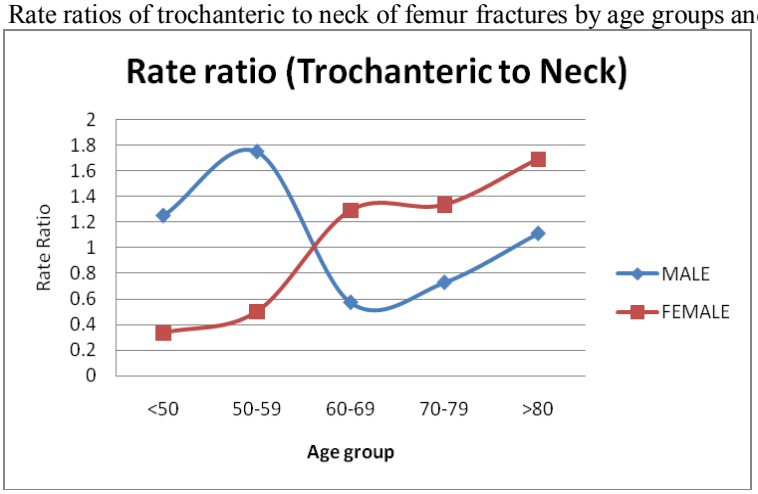
3.2 Rate ratios of sub types of hip fracture

A rate ratio of trochanteric to neck of femur fractures by age groups and gender is shown in Table 3 and Figure 3. A steady increase is noted among females across the age groups from <50 to the older age. In male, there is an increased ratio in the age group till 59 years and later there is a decline till age 79.

Table 3. Rate ratios of trochanteric to neck of femur fractures by age groups and gender

Rate ratio		
Age groups in years	**Male**	**Female**
<50	1.25	0.333
50-59	1.75	0.5
60-69	0.571	1.29
70-79	0.727	1.333
>80	1.11	1.69

Figure 3. Rate ratios of trochanteric to neck of femur fractures by age groups and gender



3.3 Comorbidities and fracture sub types

The association of comorbidities to the sub types of fracture is given in Table 4. There was no association observed in most of the diseases except in those with bronchial asthma. Among those with asthma, the association was strong (8.6% in trochanteric versus 1.7 % in neck of femur: p =0.013). Steroid intake was associated in those with trochanteric fractures (7.9%) compared to neck of femur (2.5%: p=0.051)

Table 4. Co-morbidities and their association with hip fracture types

		Fracture type				Total		χ^2 (p value)
		Neck of femur		Trochanteric				
		N	%	N	%	N	%	
Any disease	Yes	84	69.4	109	71.7	193	70.7	0.170(p=0.680)
	No	37	30.6	43	28.3	80	29.3	
DM*	Yes	53	43.8	67	44.1	120	44	0.002
	No	68	56.2	85	55.9	153	56	(p=0.963)
HTN**	Yes	57	47.1	74	48.7	131	48	0.067 0.796
	No	64	52.9	78	51.3	142	52	
Renal Disease	Yes	7	5.8	7	4.6	14	5.1	0.193(0.661)
	No	114	94.2	145	95.4	259	94.9	
Hepatic disease	Yes	0	0	1	0.7	1	0.4	0.799 (0.371)
	No	121	100	151	99.3	272	99.6	
COPD#	Yes	10	8.3	11	7.2	21	7.7	0.100(0.752)
	No	111	91.7	141	92.8	252	92.3	
Steroid intake	**Yes**	**3**	**2.5**	**12**	**7.9**	**15**	**5.5**	**3.805(0.051)**
	No	**118**	**97.5**	**140**	**92.1**	**258**	**94.5**	
Asthma	**Yes**	**2**	**1.7**	**13**	**8.6**	**15**	**5.5**	**6.177(0.013)**
	No	**119**	**98.3**	**139**	**91.4**	**258**	**94.5**	
CAD##	Yes	9	7.4	13	8.6	22	8.1	0.113 (0.737)
	No	112	92.6	139	91.4	251	91.9	
CVA###	Yes	12	9.9	25	16.4	37	13.6	2.452 (0.117)
	No	109	90.1	127	83.6	236	86.4	
Epilepsy	Yes	7	5.8	5	3.3	12	4.4	0.998 (0.318)
	No	114	94.2	147	96.7	261	95.6	

*Abbreviations: *DM diabetes mellitus; **HTN Hypertension; COPD# chronic obstructive pulmonary disease; ## CAD Coronary artery disease; ### CVA Cerebro vascular accidents*

3.4 Duration of hospital stay

Duration of total hospital stay, pre operative and postoperative stay in days and co morbidity with hip fracture is depicted in Table 5. The median duration of total hospital stay; pre operative and postoperative stay is significantly more in those with any morbidity.

Table 5. Duration of total hospital stay, pre operative and postoperative stay in days and comorbidity with hip fracture

Comorbidities	N	Duration of total hospital stay (days)							
		Mean	sd	Minimum	First quartile	Median	Third quartile	Maximum	Mann-Whitney
Yes	193	13.6	4.2	2.0	11.0	13.0	16.0	28.0	P<0.001
No	80	11.0	3.6	5.0	8.0	10.5	13.0	21.0	
Duration of Pre OP hospital stay									
Yes	193	3.8	2.1	1.0	2.0	4.0	5.0	13.0	<0.003
No	80	3.0	1.4	1.0	2.0	2.0	4.0	7.0	
Duration of Post OP hospital stay									
Yes	193	9.7	3.6	1.0	7.0	10.0	12.0	22.0	<0.001
No	80	8.0	3.2	3.0	6.0	7.0	10.0	18.0	

IV. Discussion

In this study of 273 subjects with hip fracture sub types, we observed no association between the subtypes and gender. The gender distribution is in agreement with the published reports of increased occurrence of both the fracture patterns in women than in men [2], [5], [17], [18]. The frequency of neck of femur fractures were greater than that of trochanteric fractures during a limited period of time, in the peri menopausal period for women and in elderly males (>60 yrs). This was in concordance with the 15 published reports by Baudoin et al[19]. The rate ratio (of trochanteric to neck of femur fractures) increased steadily in women with a steep increase in the immediate post menopausal period whereas in males, there was a steep decrease in the phase corresponding to steep increase in women. The rate ratio in our study touched unity at around the age of 60 in men and women in contrast to the age of 75-85 in the US population [5]. A small increase in proportion of neck fractures in men and trochanteric fractures in women with age is consistent with the observations of Tanner et al[2] and Karagas et al and [20] . This difference may be due to the fact that in ages between 60-75,women loose

bone from all sites of the skeleton with maximum loss in trochanteric region in contrast to men who lose only minimally at the trochanteric region, and gained bone mass at the Ward's triangle over the period [21]. Other reason could be perhaps with increasing age, there is a tendency to fall, and that too in a different way [22]. Fall onto the greater trochanter is a phenomenon of old age and it has been shown that the lateral fall onto the greater trochanter is particularly difficult to protect oneself during the fall [23–25].

There was no association with co morbidities to any particular fracture pattern except in those with bronchial asthma (p=0.013) and prolonged steroid intake (p .051) and trochanteric fractures. The stronger association with asthma could be due to osteoporotic risk factors pertinent to asthmatic patients[26], [27] which could be related to medications/lifestyle/genetic/associated endocrine or associated chronic disorders. There was small increase in hypertension and coronary artery disease in trochanteric fractures; however, this was not statistically significant.

There was a strong association between the co-morbidities and the total duration (p <. 001), pre operative (p<. 003) and postoperative hospital stay (p<. 001). This is similar to the study of Chen et al [28] suggesting that higher co morbidities in hip fractures incurred higher hospitalization costs as well. Hence, by addressing the co morbidities, we may be able to lower the duration of hospitalization and thereby treatment costs by better managing co morbidities that have the greatest impact on hospitalization costs.

We would like to address some of the limitations in this study. The sample size was smaller and this being a retrospective analysis, we did not evaluate the complications or functional outcome of subjects, In addition, this is a single centre study in a tertiary hospital and hence limits its external validity. The costing of treatment and the post discharge chronic care costs have not been obtained. Since there is an association of duration of stay and co morbidities, there is a scope economic analysis for the incremental cost for the morbidities; this study may serve as a model for future prospective studies with costing and functional status.

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