Original Research Article

Epedemiology and long term trend of distal radius fracture in elderly of Sindhudurg, west cost of Maharashtra, India: A 12 years follow up study

Abstract

Aims: The accurate prevalence and trend of distal radius fracture is not well documented in Maharashtra, India.This hospital based study amis to provide authentic incidence rates of this fracture and long term trend in elderly residents of Sindhudurg.

Study design: Department of Orthopaedics, Government District Hospital, Sindhudurg, Maharshtra,India, between 2000 to 2011.

Methodology: All patients of distal radius fracture, above the age of 50 years treated by one surgeon at one hospital are included in this retrospective study, solely on the final diagnosis mentioned on case paper according to Frykman classification system.

Results: There were 947 distal radius fractures, out of which 644 (66.1%) men. This study notifies the increased incidence of distal radius fracture in elderly men, than in women, contrary to the western hemisphere literature. The incidence was highest in men between 51 to 70 years with almost linear rise up to the end of study period; with a relative risk of 2.2 (95% CI 2.1 to 2.6). A border line evidence of straight rise in women was seen at 71 to 80 years ($p = 0.05$) with a common odd ratio of 1.1 (95% CI 0.7 to 1.5). The age range 51 to 70 years showed homogeneity ($p = 0.21$) with 2.1 (95% CI 1.7 to 2.9). A definite increasing trend is observed, during rainy season of June to September months through out the whole study period with rates as high as for both sexes, 423(43.4%) ($p>0.001$)

Conclusion: This long term study reported increasing trend in the incidence of distal radius fractures in both elderly men and women. The incidence was highest in 51 To 70 years age group with highest number of low energy falls. This will be of great help for the future benefit risk ratio of fragility distal radius fracture prevention efforts.

Key Words: Distal radius fracture, trend, incidence, Sindhudurg, epidemiology, osteoporosis, fragility fracture

Introduction:

Distal radius fractures are very common among older men and women with the lifetime risk of about 15% [1]. For reasons not fully understood, likely multifactorial, the incidence of this fracture is on increasing trend in the west. [2] Fragmented orthopedic care and inadequate health facilities in interior rural India can make accounting for the true number of these distal radius fractures very difficult. Associated with this, scanty published epidemiological studies on this fracture in Maharashtra, India are likely to underestimate comparatively the true incidence as against, typically quoted in the western literature. [3] The elderly population is considered at high risk for this injury, often result from a fall and the contributing factor is osteoporosis in majority. [4] The elderly people sustaining this fracture suffer from number of complications including temporary alteration in their ability to function, to preclude independent living. [5] Following this, they often some times fail to regain full mobility, losing decline in some function permanently. [6]

For the last four decades, distal radius fractures have also been shown to be a predictor of more serious subsequent fracture like commonest being hip fracture in elderly. [7] Hence understanding the epidemiology of this distal radius fracture can help the orthopedic surgeon to treat effectively fragility distal radius fracture and thus prevent further subsequent fractures [8]

In this retrospective study it is aimed to present up to date fracture incidence data and long term trends in distal radius fracture of elderly population treated at Government District hospital, Sindhudurg between 2000 to 2011 are studied.

Materials and Methods:

Data analyzed in this study were obtained from Govt. District hospital treating distal radius fractures between 2000 to 2011, estimated to cover more than 90% of Sindhudurg population. Using the hospital out patient, indoor and radiology records with operation theatre registers of all distal radius fracture patients with fracture characteristics as well as fracture treatment registered by the treating doctor above the age of 50 years were identified. The selection of cases in this study was based solely on the final diagnosis mentioned on case paper, because it represents the condition to which the episode in hospital is most attributable. Radiography confirmed each diagnosis of distal radius fracture. Fractures were classified according to Frykman classification system.

This Sindhudurg district is situated on the border between Maharashtra, Karnatak and Goa states. The distal radius fracture patients of neighbouring states are also being treated at this district hospital. But only patients of permanent residents of Sindhudurg, whose fractures have oecured in Sindhudurg are only registered in this study.

The distal radius fracture rates were calculated for both men and women, expressed as the number of cases per 10 ,000 people per year by sex and age group. Population figures for each age group were obtained from District Collector, statistics department with census data of Maharashtra state Government.(9) The rates were standardized to population to adjust for any differences that may have arisen from a change in the age structure of the population. These were derived from multiplying the age specific rates for each year by the population of each 10 years age group in the standard population. To compute the total number of cases that would have been observed if the population structure in a given year of study was the

same as that of standard population. Poisson regression modelling was used to test for the significance of the observed trends with the injury rate as the dependent variable.

Results:

Over the period 2000 to 2011 there were 974 distal radius fractures in patients aged above 50 years from Sindhudurg residents. There were 644(66.1%) men and women contributed 330(33.9 %)

The majority of distal radius fractures were due to low velocity trauma with outdoor and indoor falls. A simple fall was the most common cause of injury in 814(83.6%). The indoor fall occurred in 532(65.4%) and fall outside home like on road public place in 282(34.6%). A fall from height represented in 86(8.8 %). A road traffic accident happened in 74(7.6%).

The very high proportion of fall related distal radius fractures 814(83.6%) increased for both men and women significantly over the study period giving an odd ratio of 3.6(95% Cl 2.8 to 4.5).This was more pronounced in women 16(4.9%) in 2000 and 53(16.1%) in 2011[Table-1(A) and 1(B)], than in men 27(4.2%) in 2000, at the beginning and 84(13.1%) in 2011 at the end of study period [Table-2(A)and 2(B)].

Table-1(A)

Age specific incidence of distal radius fracture in women From 2000-2005

Age in years	2000	2001	2002	2003	2004	2005
51-60	5(31.3%)	7(41.2%)	5(29.4%)	6(27.3%)	7(41.2%)	8(34.8%)
61-70	6(37.5%)	7(41.2%)	6(35.3%)	9(40.9%)	5(29.4%)	7(30.4%)
71-80	2(12.5%)	3(17.6%)	4(23.5%)	5(22.7%)	3(17.6%)	4(17.4%)
81-90	1(6.3%)	0(0.0%)	1(5.9%)	1(4.5%)	2(11.8%)	3(13.1%)
91-100	2(12.5%)	0(0.0%)	1(5.9%)	1(4.5%)	0(0.0%)	1(4.3%)
Above 100	0(0.0%)	0(0.0%)	0(0.0%)	0(0.0%)	0(0.0%)	0(0.0%)
Total	16(4.9%)	17(5.2%)	17(5.2%)	22(6.7%)	17(5.2%)	23(6.9%)

Table-1(B)

Age specific incidence of distal radius fracture in women From 2006-2011

Age in years	2006	2007	2008	2009	2010	2011
51-60	7(26.9%)	10(35.7%)	9(25.7%)	10(27.8%)	8(20.0%)	12(22.6%)
61-70	9(34.6%)	11(39.3%)	8(22.9%)	9(25.0%)	10(25.0%)	13(24.5%)
71-80	6(23.1%)	5(17.6%)	7(20.0%)	8(22.2%)	9(22.5%)	11(20.8%)
81-90	3(11.5%)	2(7.1%)	6(17.1%)	5(13.9%)	7(17.3%)	9(16.9%)
91-100	0(0.0%)	0(0.0%)	5(14.3%)	4(11.1%)	6(15.0%)	7(13.2%)
Above 100	1(3.8%)	0(0.0%)	0(0.0%)	0(0.0%)	0(0.0%)	1(1.9%)
Total	26(7.9%)	28(8.5%)	35(10.6%)	36(10.9%)	40(12.1%)	53(16.1%)

Table-2(A)

Age specific incidence of distal radius fracture in men From 2000-2005

Age in years	2000	2001	2002	2003	2004	2005
51-60	9(33.3%)	11(33.3%)	10(29.4%)	13(31.7 %)	12(30.0 %)	16(30.2 %)
61-70	11(40.7%)	12(36.4%)	14(41.2%)	15(36.6%)	16(40.0%)	17(32.1%)
71-80	5(18.5%)	6(18.2%)	5(14.7%)	7(17.1%)	6(15.0%)	9(16.9%)
81-90	1(3.7%)	3(9.1%)	4(11.8%)	4(9.8%)	5(12.5%)	6(11.3%)
91-100	1(3.7%)	0(0.0%)	1(2.9%)	2(4.9%)	1(2.5%)	4(7.5%)
Above 100	0(0.0%)	1(3.0%)	0(0.0%)	0(0.0%)	0(0.0%)	1(1.9%)
Total	27(4.2%)	33(5.1%)	34(5.3%)	41(6.4%)	40(6.2 %)	53(8.2%)

Table-2(B)

Age specific incidence of distal radius fracture in men From 2006-2011

Age in years	2006	2007	2008	2009	2010	2011
51-60	18(31.6 %)	21(34.4%)	18(27.7%)	21(28.0 %)	19(25.7%)	23(27.4%)
61-70	21(36.8%)	20(32.8%)	26(40.0%)	22(29.3%)	21(28.4%)	24(28.6%)
71-80	11(19.3%)	10(16.4 %)	12(18.5%)	14(18.6 %)	12(16.2 %)	16(19.1 %)
81-90	5(8.8 %)	8(13.1%)	5(7.7%)	13(17.3%)	14(18.9%)	13(15.5%)
91-100	2(3.5%)	2(3.3%)	4(6.2%)	5(6.6%)	7 (9.5%)	8(9.5%)
Above 100	0(0.0%)	0(0.0%)	0(0.0%)	0(0.0%)	1(1.4%)	0(0.0%)
Total	57(8.9 %)	61(9.5 %)	65(10.1%)	75(11.6%)	74(11.5%)	84(13.1 %)

Incidence per 10,000 person years, directly age adjusted to the population structure of 2001 & 2011 Sindhudurg 51 years and above.

The distal radius fractures per 10,000 population increased significantly in both men and women from 2000 to 2011.(Table-3).

Table-3

Incidence of distal radius fractures in men and women of Sindhudurg from

2000 to 2011

Sr. No.	Year	Men			Women		
		No. of fractures	Population at risk in thousands	Incidence per 10,000	No. of fractures	Population at risk in thousands	Incidence per 10,000
1	2000	27	416123	0.65	16	448242	0.36
2	2001	33	417890	0.79	17	450935	0.38
3	2002	34	420235	0.81	17	453466	0.37
4	2003	41	421999	0.97	22	455369	0.48
5	2004	40	423763	0.94	17	457272	0.37
6	2005	53	425527	1.25	23	459176	0.50
7	2006	57	427291	1.33	26	461079	0.56
8	2007	61	429055	1.42	28	462982	0.60
9	2008	65	430818	1.51	35	464886	0.75
10	2009	75	432582	1.73	36	466789	0.77
11	2010	74	434346	1.70	40	468693	0.85
12	2011	84	417332	2.01	53	432319	1.23
13	Total	644			330		

Population at risk and number of distal radius fractures from 2000 to 2011. The annual incidence is calculated in age and sex groups for the total year.

This was observed in all age groups, pronounced much more so in men of 51 to 70 years and women of 51 to 80 years age group. The highest increase was observed in men aged 51 to 70 years 20(3.1%) /10000 population in 2000 to almost more than double 47(7.2%) / 10,000 population in 2011 ($p>0.0001$) In this study the distal radius fracture were more commonly seen in rainy season of June to September 280(43.5%) in men and 143(43.3%) women than other months in the rest of the year ($p>0.001$) [Table-4(A)and 4(B)]

Table-4(A)

Distribution of distal radius fractures with seasonal variations per every month of year (2000to 2011) From January To June

Gender	January	February	March	April	May	June
Male	38(5.9%)	36(5.6%)	48(7.5%)	52(8.1%)	54(8.4%)	76(11.8%)
Female	19(5.8%)	21(6.4%)	22(6.7%)	28(8.5%)	27(8.2%)	37(11.2%)

Table-4(B)

Distribution of distal radius fractures with seasonal variations per every month

of year (2000to 2011) From July To December

Gender	July	August	September	October	November	December
Male	84(13.0%)	62(9.6%)	58(9.0%)	44(6.8%)	53(8.2%)	39(6.1%)
Female	44(13.3%)	32(9.7%)	30(9.1%)	24(7.3%)	25(7.6%)	21(6.4%)

Age standardized hospitalised admission rates also increased significantly and were particularly notable in men rising from 27(4.2%) /10,000 population in 2000 to 84(13.1%) / 10,000 population in 2011.

The average length of hospital stay for distal radius fractures increased sligtly but not significantly from 3.6 days in 2000 to 4.2 days in 2011 (95% Cl 3.1 to 4.8) However, the total number of indoor admission days rose from 154.8 days in 2000 to 575.4 days in 2011 ($p > 0.001$). This reflects the observed increase in number of hospitalized distal radius fractures.

Discussion:

This study enlightens the increased incidence of distal radius fracture in elderly men, than that found in women, contrary to the western hemisphere literature to the opposite trend found in elderly population [10]. This gender difference is considered to be related to social living style and culture in Maharashtra, India.[11] The elderly women, being nurtured at home by dear near younger relatives, predominently in this district of rural Maharashtra who are staying at home in joint families, which is still exihisting in this region. The elderly active men are known to have a significantly greater risk of this injury than women, who move around and go out for day today routine house hold and agricultural work with increased physical activity levels. This difference is also not considered to be related to the impact of osteoporosis, as both men and women loose bone mass as a result of aging.[12] The rate of loss is quicker and much more pronounced in women.[13] A contributory factor from this study could be the overall higher incidence of falls in men who are actively working elderly males. Contrary to this study a large prospective study from the west conveys that the yearly incidence of falls in women was 40% compared to 28% in men.[14] In one of the largest study, the gender discrepancies occurred, approximately 4.88 times more in women.[15] This is in direct contrast to rate ratios, where women had a risk factor of around three times than of men.[16] They reported that the incidence of women increased rapidly from 50 years and older almost doubling every ten years until 90 years of age. A similar trend is seen, which took a closer look, breaking the age groups in to five year increments and found a similar trend, contrary to this study.[17] That is how, this establishes the age and gender have a pronounced effect on the incidence rates of distal radius fractures in elderly community.[18]

This study showed a gradual increase in the hospitalized distal radius fractures for both men and women. A similar increase was observed in a long term study from west during 1971 to

1995 [19] Another hospital based study had similar increase in this fracture over a period of 1993 to 2003.[20] Such similar comparisons could not be done from this region of Maharashtra, India due to lack of enough published material, on the epidemiology of distal radius fractures in literature. This gradual increase suggests that the incidence of distal radius fracture is likely to be related to the aging population and might partly explain modest but statistically significant increase in age specific Sindhudurg district hospitalization rates[21]. It is worth noting that the difference in trend rates in both men and women above 80 years of age is very small in women compared to men. These very small counts are susceptible for higher fluctuation rates. The database from the same district Sindhudurg and from the same author and institute determined in, 2004 that 2.5% of all emergency department visits were due to distal radius fractures. [22] This study corresponds to a study showing that distal radius fractures also accounted for 2.5 % of all emergency department visits.[23] Current and past clinical data point to a rise in the incidence of distal radius fractures for elderly populations in recent years.[24] This phenomenon has been a subject of debate for the last half century. The incidence in Sweden is almost doubled for elderly population over 40 years of age.[25] From Rochester, Minnesota found 17% increase in the incidence of this injury over a 40 year period.[26]

Thus lending further validity is established to the increase in distal radius fracture as a legitimate trend. Although there is no single factor responsible for this occurrence due to the absolute prevelence of distal radius fracture any individual contributing factor is bound to have confounding variables. [27] Additionally, as the population ages and older men from this Sindhudurg district who strive to remain active, fracture due to relatively minor trauma are likely to increase in forth coming years. This study data reveals the significant socioeconomic costs incurred as a direct result of this fragility fracture. Thus high lighting the importance of analysing the preventive measures and treatment protocols, including for osteoporosis who are at high risk for or suffer from this injury.

Never the less the epidemiological data collected in this report has added to our knowledge of distal radius fractures in Sindhudurg, Maharashtra, Indian population.

Conclusion:

This study found a modest increase in distal radius fractures above the age of 50 years, much more so in elderly men over a period of 2000 to 2011 in Sindhudurg. This is likely to continiue in future imposing considerable burden on health care services.

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