

Original Research Article

Rising incidence of hip fractures in Sindhudurg west coast of Maharashtra, South India (2000 to 2011)

Raghavendra S. Kulkarni^{1*}, Aditya P. Kulkarni², Rachana A. Kulkarni²,
Ranjani R. Kulkarni³, R. S. Deshpande⁴, Sriram R. Kulkarni⁵

¹Department of Orthopaedics, SSPM Medical College and Lifetime Hospital, Padave, Sindhudurg, Maharashtra, India

²Medical Officer, NCD, Civil Hospital, Oros, Sindhudurg, Maharashtra, India

³Medical Officer, ECHS Polyclinic, Sindhudurgnagari, Sindhudurg, Maharashtra, India

⁴Department of Anaesthesiology, SSPM Medical College and LT Hospital, Padve, Sindhudurg, Maharashtra

⁵Government Medical College and Hospital, Miraj, Maharashtra, India

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*Correspondence:

Dr. Raghavendra S. Kulkarni,

E-mail: rskulkarnics53@gmail.com

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ABSTRACT

Background: The incidence of hip fractures in Sindhudurg, west coast of Maharashtra has been reported in relation to age and gender.

Methods: Using the medical records and X-ray registers from May 2000 to October 2011, all patients of proximal femoral fractures were recorded and included in this study. The data was cross checked doubly with details of indoor case papers against ward admission and operation theatre registers, were found to be congruent after verifying the names of patients.

Results: The total male incidence was bimodal with moderate peaks at 31 to 50 years and very high at 51 to 70 years. The female incidence with peaks at 41 to 60 years with regular steady increase up to 80 years. Males of 31 to 70 years 2.5 times more likely to sustain a fracture (95% CI 2.3 to 2.8) than females. Females between 40 to 60 years 2.8 times more likely to sustain fracture than males (95% CI 2.5 to 3.0). The trend was stable from year to year. This high increase in hip fractures in men of 51 to 70 years incidence documented osteoporotic fractures in contrast with too much emphasis on the importance of menopause in hip fractures.

Conclusions: Despite wide variations in age specific hip fracture rates over a decade, reasons for differences are not clear. From 2000 to 2011, the hip fractures in district hospital increased by a factor of 6.6%, 14.34% in both the genders above the age of 41 years in parallel with hospital admissions.

Keywords: Hip fracture, Secular trends, Hospital admissions, Proximal femoral fracture, Rising incidence

INTRODUCTION

The increasing incidence of hip fractures imposes great strain on Govt. hospital resources with serious problems for both health policy makers and health organizations, merits urgent investigation.¹

Hip fractures are known since long time as characterized feature of aging.² More than one and half century back, Sir

Astely Cooper documented thinning of bones which accompanied aging. Hip fractures, a very costly public health problem, a close indicator of osteoporosis in a population, nearly all are admitted to hospitals.³ There is a great change in increase of lifespan in both genders for the past twenty five years leading to increase in number of these fractures with concurrent rise in hospital admissions.⁴ The crucial question is therefore, whether increase hospital hip fractures data truly represent the

increase in age specific incidence of hip fractures?⁵ A great number of investigators studied the incidence of hip fractures in many countries over the globe.⁶⁻¹⁰ Great differences have been found on the basis of hospital studies at regional or national level, conducted at different calendar years.¹¹ The incidence of hip fracture varies tremendously between the countries and also within the same country in different regions.¹² The projection of annual incidence of hip fractures is expected to reach 6.26 million worldwide by 2050, more than five times than that of 1990.¹³ The Asia would account for over half of hip fractures.¹⁴ The western hemisphere studies show divergent results on time trends in elderly hip fracture incidence.¹⁵ A significant increase in elderly women and some indicate significant increase in both the sexes.^{16,17} Some published articles analyze, a decreasing trend in women but a significant increase in elderly women of higher age.^{18,19} However a number of reports show a leveling off and some, a decline during last decades.^{20,21}

India is the second larger populous country in the world, with national incidence of hip fractures in elderly patients associated with its secular trend are unknown so far.

Very few studies from small regions of different states are there from India, having similar demographic, meteorological conditions and social dietary habits.^{22,23} This further highlights the need to focus on the problem of elderly hip fractures for this region.

This is a Kokan region district study of west Arabian sea coast of Maharashtra state, from South India where in retrospective epidemiological assessment of hip fracture is presented. The aim of this study was to determine the incidence of hip fractures from careful interpretation of most accurate assessment of Govt. District hospital data over a period of 2000 to 2011 of Sindhudurg.

METHODS

Data from the Govt. District Hospital Sindhudurg, Maharashtra state of South India, admission register is used for this study over a period of May 2000 to October 2011. This register does have the documentation of patient, age, sex, address, diagnosis along with date of admission and discharge.

Sindhudurg is the southernmost district in Maharashtra, being on border of Karnataka and Goa states. The whole district is situated on western bank of Arabian Sea, with an estimated catchment total population of 868825 (417890 males and 450,935 females) in 2001 and 849,651 (417,332 males and 432,319 females) in 2011 as per Census. Bureau of India.²⁴ In Sindhudurg there are 9 rural hospitals, 3 sub-district hospitals, and 38 primary health centers who refer suspected hip fracture patients to district hospital, the only Govt. hospital in Sindhudurg district, which has got facilities to treat hip fractures conservatively and surgical intervention with full time orthopedic surgeon, the author himself working round the clock.

Using the medical records and X-ray registers from May 2000 to October 2011 all patients of proximal femoral fractures were recorded and included in this study. The detail demographic information about every patient of hip fracture was obtained and documented on a computer data base for subsequent analysis who all were under care of author. The data was cross checked doubly with details of indoor case papers against ward admission and operation theatre registers, were found to be congruent after verifying the names of patients.

The population at risk of Sindhudurg with details of age and gender for each ten-year age groups with the number of fractures were calculated. The age, gender specific incidences were derived and expressed as fractures per 1,00,000 inhabitants per year. This crude incidence rate of hip fractures was computed as new case for the particular year in each category for one gender; divided by the count of sub population of the same age category and gender. Odd ratios were calculated from these figures with 95% confidence intervals for small groups, were calculated for homogeneity and these were determined by means of Bresnw and Day test, indicating evidence of heterogeneity.

RESULTS

Over a period of twelve years 1024 proximal femoral fractures at and above level of lesser trochanter were recorded retrospectively, from the medical records of Govt. district hospital, Sindhudurg. 92 (9.0%) sustained more than one fracture. In this study group there were 480 (46.9%) males and 544 (53.1%) females. As per indoor register 996 (97.3%) were admitted out of which 484 (48.6%) males and 512 (51.4%) females. As per OPD register 28 (2.7%) patients were treated as outdoor patients in which 16 (1.6%) males and 12 (1.2%) females were treated conservatively with traction and derotation boot in outpatient department. 624 (60.9%) fractures were referred from primary health centers and rural hospitals.

A linear increase in absolute number of fractures 55 in 2000 to 121 in 2011 was documented. The lowest incidence of fractures, regardless age and sex was seen in 2000, and the highest was in 2011 (Table 1). Crude incidence rate per one lakh population increased from 6.6 (95% CI 3.24 to 5.71) in 2000 to 14.2 (95% CI 10.42 to 13.96) in 2011. For men it increased from 6.2 (95% CI 4.27 to 7.29) in 2000 to 13.9 (95% CI 10.92 to 14.16) in 2011 (Table 2). For women 6.9 (95% CI 3.88 to 7.19) in 2000 to 14.6 (95% CI 10.46 to 15.33) in 2011 (Table 3). A very clear increase in the incidence of fractures with increasing age was very much evident in both sexes.

A higher incidence of fractures was seen in men than women in the age groups of 51 to 70 years. The total male incidence was having peaks at 31 to 50 years with higher summit 51 to 70 years in comparison with females at 41 to 60 years. The demographic details over indoor case papers were incomplete in 22 (2.2%) and of outpatient case papers in 11 (39.3%). Hence the total error rate in this sample is 33 (3.2%).

Table 1: Total number of hip fractures per 10,000 population per annum with respect to age.

Age group (in years)	2000 (%)	2001 (%)	2002 (%)	2003 (%)	2004 (%)	2005 (%)	2006 (%)	2007 (%)	2008 (%)	2009 (%)	2010 (%)	2011 (%)	Total (%)
0 to 10	1 (1.81)	0 (0.00)	0 (0.00)	1 (1.42)	0 (0.00)	0 (0.00)	1 (1.13)	1 (1.11)	1 (0.99)	0 (0.00)	1 (0.86)	2 (1.65)	8 (0.78)
11 to 20	1 (1.81)	1 (1.66)	0 (0.00)	2 (2.85)	2 (2.81)	1 (1.26)	1 (1.13)	2 (2.22)	1 (0.99)	0 (0.00)	0 (0.00)	2 (1.65)	13 (1.26)
21 to 30	3 (5.45)	3 (5.00)	4 (6.15)	2 (2.85)	2 (2.81)	3 (3.79)	1 (1.13)	6 (6.66)	2 (1.98)	0 (0.00)	4 (3.47)	6 (4.95)	36 (3.51)
31 to 40	4 (7.27)	5 (8.33)	7 (10.76)	7 (10.00)	9 (12.67)	7 (8.86)	10 (11.36)	10 (11.11)	12 (11.88)	13 (11.92)	15 (13.04)	19 (15.70)	118 (11.52)
41 to 50	7 (12.72)	12 (20.00)	11 (16.92)	13 (18.57)	10 (14.08)	14 (17.72)	16 (18.18)	17 (18.88)	20 (19.80)	21 (19.26)	24 (20.86)	21 (17.35)	186 (18.16)
51 to 60	13 (23.63)	15 (25.00)	15 (23.07)	18 (25.71)	18 (25.35)	21 (26.58)	22 (25.00)	18 (20.00)	21 (20.79)	26 (23.85)	26 (22.60)	28 (23.14)	242 (23.63)
61 to 70	15 (27.27)	15 (25.00)	19 (29.23)	14 (20.00)	17 (23.94)	20 (25.31)	21 (23.86)	20 (22.22)	21 (20.79)	26 (23.85)	24 (20.86)	23 (19.00)	235 (22.94)
71 to 80	6(10.90)	4 (6.66)	7 (10.76)	7 (10.00)	8 (11.26)	8 (10.12)	8 (9.09)	10 (11.11)	14 (13.86)	16 (14.67)	13 (11.30)	13 (10.75)	114 (11.13)
81 to 90	2 (3.63)	3 (5.00)	1 (1.53)	4 (5.71)	2 (2.81)	3 (3.79)	3 (3.40)	2 (2.22)	3 (2.97)	3 (2.75)	6 (5.21)	4 (3.30)	36 (3.51)
91 to 100	3 (5.45)	2 (3.33)	1 (1.53)	2 (2.85)	3 (4.22)	2 (2.53)	4 (4.54)	4 (4.44)	6 (5.94)	4 (3.66)	2 (1.73)	3 (2.47)	36 (3.51)
Total	55 (5.37)	60 (5.85)	65 (6.34)	70 (6.83)	71 (6.93)	79 (7.71)	88 (8.59)	90 (8.78)	101 (9.86)	109 (10.64)	115 (11.23)	121 (11.81)	1024

Table 2: Hip fractures per 10,000 population per annum with respect to age in men.

Age group (in years)	2000 (%)	2001 (%)	2002 (%)	2003 (%)	2004 (%)	2005 (%)	2006 (%)	2007 (%)	2008 (%)	2009 (%)	2010 (%)	2011 (%)	Total (%)
0 to 10	0 (0.00)	0 (0.00)	0 (0.00)	1 (3.1)	0 (0.00)	0 (0.00)	1 (2.4)	0 (0.00)	1 (2.0)	0 (0.00)	1 (1.9)	1 (1.8)	5 (1.0)
11 to 20	1 (4.2)	0 (0.00)	0 (0.00)	1 (3.1)	2 (5.7)	1 (2.6)	1 (2.4)	1 (2.2)	1 (2.0)	0 (0.00)	0 (0.00)	1 (1.8)	9 (1.9)
21 to 30	2 (8.3)	1 (3.7)	3 (10.0)	1 (3.1)	2 (5.7)	3 (7.9)	0 (0.00)	3 (6.7)	0 (0.00)	0 (0.00)	3 (5.7)	4 (7.3)	22 (4.6)
31 to 40	2 (8.3)	4 (14.8)	6 (20.0)	6 (18.7)	7 (20.0)	6 (15.8)	9 (21.4)	8 (17.7)	9 (18.7)	9 (17.6)	8 (15.0)	10 (18.1)	84 (19.2)
41 to 50	1 (4.1)	4 (14.8)	5 (16.6)	6 (18.7)	5 (14.3)	7 (18.4)	8 (19.0)	10(22.2)	11 (22.9)	10 (19.6)	12 (22.6)	10 (18.1)	89 (18.5)
51 to 60	6 (25.0)	7 (25.9)	5 (16.6)	7 (21.9)	8 (22.8)	8 (21.0)	8 (19.0)	7 (15.5)	9 (18.7)	12 (23.5)	11 (20.7)	12 (21.8)	100 (20.8)
61 to 70	7 (29.1)	6 (22.2)	7 (23.3)	5 (15.6)	6 (17.1)	8 (21.0)	9 (21.4)	11 (21.6)	10 (20.8)	11 (21.6)	10 (18.9)	10 (18.1)	100 (20.8)
71 to 80	3 (12.5)	2 (7.4)	3 (10.0)	2 (6.2)	2 (5.7)	3 (7.9)	2 (4.8)	3 (6.7)	4 (8.3)	5 (9.8)	4 (7.5)	5 (9.0)	38 (7.9)
81 to 90	1 (4.2)	2 (7.4)	1 (3.3)	2 (6.2)	1 (2.8)	1 (2.6)	2 (4.8)	1 (2.2)	0 (0.00)	1 (2.0)	2 (3.8)	1 (1.8)	15 (3.1)
91 to 100	1 (4.2)	1 (3.7)	0 (0.00)	1 (3.1)	2 (5.7)	1 (2.6)	2 (4.8)	1 (2.2)	3 (6.2)	3 (6.2)	2 (3.8)	1 (1.8)	18 (3.7)
Total	24 (5.0)	27 (5.6)	30 (6.2)	32 (6.6)	35 (7.3)	38 (7.9)	42 (8.7)	45 (9.4)	48 (10.0)	51 (10.6)	53 (11.0)	55 (11.4)	480 (46.9)

Table 3: Hip fractures per 10,000 population per annum with respect to age in women.

Age group (in years)	2000 (%)	2001 (%)	2002 (%)	2003 (%)	2004 (%)	2005 (%)	2006 (%)	2007 (%)	2008 (%)	2009 (%)	2010 (%)	2011 (%)	Total (%)
0 to 10	1 (3.2)	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)	1 (2.2)	0 (0.00)	0 (0.00)	0 (0.00)	1 (1.5)	3 (0.5)
11 to 20	0 (0.00)	1 (3.0)	0 (0.00)	1 (2.6)	0 (0.00)	0 (0.00)	0 (0.00)	1 (2.2)	0 (0.00)	0 (0.00)	0 (0.00)	1 (1.5)	4 (0.7)
21 to 30	1 (3.2)	2 (6.0)	1 (2.9)	1 (2.6)	0 (0.00)	0 (0.00)	1 (2.8)	3 (6.7)	2 (3.8)	0 (0.00)	1 (1.6)	2 (3.0)	14 (2.6)
31 to 40	2 (6.5)	1 (3.0)	1 (2.9)	1 (2.6)	2 (5.6)	1 (2.4)	1 (2.8)	2 (4.4)	3 (5.7)	4 (6.9)	7 (11.3)	9 (13.6)	34 (6.3)
41 to 50	6 (19.4)	8 (24.2)	6 (17.1)	7 (18.4)	5 (13.9)	7 (17.1)	8 (17.4)	7 (15.5)	9 (17.0)	11 (19.0)	12 (19.3)	11 (16.7)	97 (17.8)
51 to 60	7 (22.6)	8 (24.2)	10 (28.6)	11 (28.9)	10 (27.8)	13 (31.7)	14 (30.4)	11 (24.4)	12 (22.6)	14 (24.1)	15 (24.2)	16 (24.2)	141 (25.9)
61 to 70	8 (25.8)	9 (27.2)	12 (34.3)	9 (23.7)	11 (30.5)	12 (29.3)	13 (28.3)	9 (20.0)	11 (20.7)	15 (25.9)	14 (22.6)	13 (19.7)	136 (25.0)
71 to 80	3 (9.7)	2 (6.0)	4 (11.4)	5 (13.1)	6 (16.7)	5 (12.2)	6 (13.0)	7 (15.5)	10 (18.9)	11 (19.0)	9 (14.5)	8 (12.1)	76 (14.0)
81 to 90	1 (3.2)	1 (3.0)	0 (0.00)	2 (5.3)	1 (2.4)	2 (4.9)	1 (2.8)	1 (2.2)	3 (5.7)	2 (3.4)	4 (6.4)	3 (4.5)	21 (3.9)
91 to 100	2 (6.5)	1 (3.0)	1 (2.9)	1 (2.6)	1 (2.4)	1 (2.4)	2 (2.2)	3 (6.7)	3 (5.7)	1 (1.7)	0 (0.00)	2 (4.5)	18 (3.3)
Total	31 (5.7)	33 (6.1)	35 (6.4)	38 (7.0)	36 (6.6)	41 (7.5)	46 (8.5)	45 (8.3)	53 (9.7)	58 (10.7)	62 (11.4)	66 (12.1)	544 (53.1)

Men between 31 to 50 years of age are 2.5 times more likely to sustain fractures than females (95% CI 2.3 to 2.8). Females from the age group of 41 to 60 years are 2.8 times likely to sustain a fracture (95% CI 2.5 to 3.0).

The Poisson regression models showed a small but statistically significant annual rise of hip fracture 1.06 (95% CI 1.04-1.08) ($p < 0.001$) the change for the period of 2000 and 2011 was 1.18 (95% CI 1.11 to 1.172). Over the whole study period, it was significantly higher in men 1.19, (95% CI 1.13 to 2.14) compared to women 1.02, (95% CI 2.04 to 2.12).

The overall annual incidence for Sindhurg is 6.6 (6.9 females and 5.7 males) for 2000 and 14.3 (15.3 females and 13.2 males) for the year 2011 per 100000 population, irrespective of age and gender. This study also has shown the age specific incidence of proximal femoral fractures is increasing since 2000 to 2011 with peaks at 51 to 70 years of age.

DISCUSSION

Every year proximal femoral fractures were admitted at District Hospital Sindhurg, possibly because of very clear distinct features of hip fractures. The demanded condition affecting both, sexes with reasonable evidence and with provision of adequate care, practically all patients come to hospital for treatment, which is well known to public, as the only Govt. public hospital, where in hip fractures are being treated. No information has been taken in to account about hip fractures from rest of all other Govt. semi Govt. hospitals in the district, as there are no facilities to treat hip fractures exhibits and also no Orthopedic Surgeon being functioning there. Hence such fractures are referred to District Government Hospital. Accordingly, all hip fractures in a well-defined population of Sindhurg, west coast of Maharashtra is well documented to provide reliable data.²⁵ The quality of data collected retrospectively from the hospital records, the accuracy favorably comparable with other orthopedic data collection systems.

The reported incidence of hip fractures in this series is little lower than in other reported studies.²⁶ A few of such patients might have been managed in private orthopedic hospitals in the district, which are not taken in to account in this paper.

The findings of this study, as regards the incidence of age and sex is in correlation with other investigators, but there are some differences.²⁷ The number of fractures in elderly men are at par comparable with that of women with no much of significant difference. Actually it is confirmed that the burden of hip fractures in elderly men are really greater than had been appreciated in the past.²⁸ A small steep rise of these fractures in women of age group between 41 to 60 years is in partial concurrence with other observers.²⁹ The median age of menopause is 50 years with 41 to 60 years as the approximate 95% confidence limits.

Hence it is felt that this increase in incidence among women of 40 to 60 years age group should not be recorded as just simply menopausal or postmenopausal.

The country specific incidence rates worldwide were determined from a systematic review of 72 studies from 63 nations were selected for inclusion into hip fractures resource.³⁰ The lowest incidence was found in Nigeria (2/100,000), South Africa (20/100000), Tunisia (58/100000). The highest rates were observed in Denmark (574/100000), Norway (563/100000), and Sweden (539/100000). Regions of low risk increase in hip fractures included India.

The number of hip fractures in elderly people has increased tremendously for the last twenty years, owing to an increase in life expectancy of this population at risk. The same trend has been reported by many studies across the world.³¹ This study is mainly based on indoor case paper and radiographic data cross checked with indoor ward registers; hence it is believed that these figures are most reliable.

In contrast to other studies, the increased number of hip fractures in this Sindhurg, seems to be the shift in demographic distribution rather than increase in specific incidence.³² The gradual consistent increase in incidence appears to be geographic.³³ A few studies have shown great differences of incidence in urban and rural areas, the fact which do not have any impact to our series, as our catchment area, mainly consists of a rural population.³⁴ The urban population of Sindhurg for 2001 and 2011 is 82,319 (41,618 males and 40,701 females) and 107006 (54,064 males and 52,942 females) respectively, which amounts to 9.5%, 12.6% accordingly.³⁵ The hip fractures in urban area showed a very small but statistically insignificant annual rise both in men and women as compared to rural area, during the whole study period it was significantly higher both in men and women.

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