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Epidemiological study of pelvic fracture in Jabalpur zone of Madhya Pradesh

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Abstract
This is a study of 244 cases of pelvic fracture presented in the selected centers of Jabalpur zone of Madhya Pradesh in the duration of two years from 2011 to 2013. Demographical characteristics of pelvic fractures like Age, Sex, Locality, Occupation, Socioeconomic Status, Associated Injury and Comorbid Condition in pelvic fracture patients were studied in particular population. All cases were classified according to Young and Burgess Classification, Tile's Classification and Letournel & Judet Classification system and studied the distribution of cases according to these classification system.

Keywords: Epidemiology, young & burgees classification, letuornel and judet classification, tile's classification

Introduction
Epidemiological data about pelvic fractures are limited. Until today, most studies only analyzed inpatient data. The purpose of this study was to estimate incidence rates of pelvic fractures in the Indian population based on outpatient and inpatient data. We conducted a prospective population-based observational study. Age and sex-specific incidence rates of fractures between 2010 and 2013 were calculated. Pelvic fractures are associated with significant morbidity and mortality for instance, one year mortality after pelvic fractures is reported to be fairly substantial, ranging from about 8%-27%. In addition, pelvic fractures will result in rising healthcare costs due to the requirement of hospital and follow-up care.

Aims and Objectives
To study the epidemiological factors of pelvic fractures in Jabalpur zone, Madhya Pradesh.

Material and Method
Type of Study:– Observational –Descriptive-Cross Sectional Study
Duration of Study – Two years from September 2011 to September 2013
Sample Size – 244 cases of pelvic fracture
Study Methodology – Major Hospitals of Jabalpur Zone were selected and all centers were located at different areas of Jabalpur zone covering almost all the population of Jabalpur zone and meet with our selection criteria. From each hospital data of pelvic fracture patients and their X-rays and CT Scan (if available) were collected and converted in digital form. From these information following epidemiological variables were derived –
1. Age incidence 2. Sex incidence 3. Nature of trauma in relation to sex
4. Nature of trauma in relation to age group 5. Type of fracture in relation to sex
6. Type of fracture in relation to age 7. Type of fracture in relation to nature of trauma

Observation
In this study 244 patients of pelvic injury were studied, those who got admitted in various selected centers of Jabalpur and may also have other trauma (associated with pelvic injury) were included. Demographical characteristics of pelvic injury patient are described in below table.

Table 1: Age and sex wise distribution of the studied cases

AGE GROUP (Yrs)	SEX		Total
	M	F	
1 – 9	0 0.0%	2 2.1%	2 0.8%
10-14	0 0.0%	1 1.1%	1 0.4%
15-19	8 5.4%	6 6.3%	14 5.7%
20-29	44 29.5%	13 13.7%	57 23.4%
30-39	46 30.9%	24 25.3%	70 28.7%
40-49	29 19.5%	17 17.9%	46 18.9%
50-59	13 8.7%	10 10.5%	23 9.4%
60-69	8 5.4%	13 13.7%	21 8.6%
70+	1 0.7%	9 9.5%	10 4.1%
Total	149	95	244

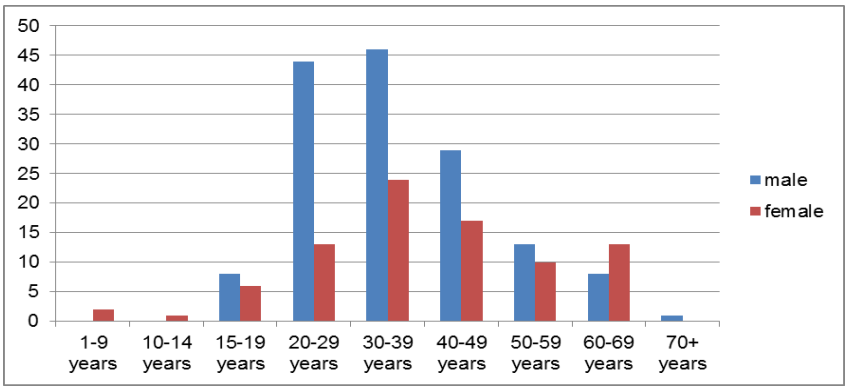

Fig 1: Age and Sex Wise Distribution

It was observed that this study was a predominantly a male and male to female ratio is **M: F, 3:2**. It is statistically significant.

According to age distribution – The mean age of the male was observed at – 35.19(+/-12.27) yrs. The mean age of female was observed at 42.49(+/- 17.55) yrs. The male population was having significantly lower mean age compared with female population (P<0.05).

Table No. 2: Distribution of Cases According to Locality

Characteristic		No. Of cases	Percentage (%)
Locality	Rural	135	55.3
	Urban	109	44.7
	Total	244	100.0

In this study 55.3 % cases (135 cases) were from rural locality and 44.7% cases (109 cases) were from urban population. So, pelvic injury occurs more commonly over rural population as compared to urban.

Table 3: Distribution of cases according to occupation

Occupation	No. Of cases	Percentage (%)
Farmer	41	16.8
Labourer	42	17.2
Service (govt + private job)	33	13.5
House hold activity	10	4.1
Business	10	4.1
Student	15	6.01
Housewife	55	22.5
Driver	8	3.3
Non –working	25	10.2
Others	5	2
Total	244	100

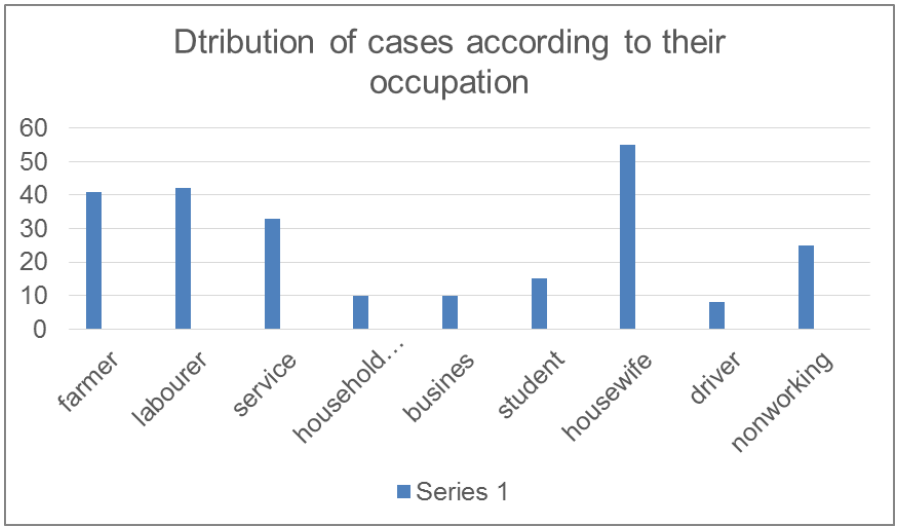

Fig 2: Occupation wise distribution

Farmer and labourer class (34%-83 cases) were more prone for pelvic injury followed by house wife group of patient which were followed by service class persons and senior citizens who resides in their home.

Table 4: Distribution of Cases According to Their Socioeconomic Status

SES	No. of Cases	Percentage (%)
Low	145	59.4
Middle	85	34.8
High	14	5.8
Total	244	100.0

From above table – 4 it is clear that low socioeconomic status persons were more prone to develop pelvic injury as they are more prone to accidents, followed-by middle and higher class persons.

Table No. 5: Study of Associated Injury among the Cases of Pelvic Injury

Associated injury	No. of cases	Percentage (%)
Nil	95	38.9
Urethral injury	31	12.7
Head injury	23	9.4
Blunt trauma chest	19	7.8
Blunt trauma abdomen	14	5.7
Upper limb injuries	35	14.3
Lower limb injuries	43	17.6
Spinal injuries	4	1.6
Associated with multiple abrasion, contusion or lacerated wound over body	12	4.9
Polytrauma (Multi System Injury)	1	0.4

The above table showed that isolated pelvic injuries were less common & these injuries were frequently associated with other body injury. Only 38.9 % (95 cases) pelvic fractures were found to be isolated pelvic injuries while rest of the pelvic fractures 62.1% (149 cases) were associated with other body injury. Most common associated injury was –lower limb fractures 17.6%, Second most common injury was –upper limb fractures 14.3% and Third Most common associated injury was –urethral injury 12.7%.

Table 6: Study of the Comorbid Condition

Comorbid condition	No. of cases	Percentage (%)
Nil	211	86.5
Osteoporosis	18	7.4
Hypertension	12	4.9
Diabetes mellitus	3	1.2
Pulmonary TB	2	0.8
Malignancy	1	0.4
Others	4	1.6

It was observed that majority of the patient had no co-morbid condition which contributes in pelvic fractures but interestingly 7.4% cases were found with osteoporosis, 4.9% with hypertension. However, this comorbid findings does not reflects their direct association with pelvic fracture.

Table 7: Distribution according to Young and Burgees classification

Type	No. of cases	Incidence (%)
Unclassified	29	11.9
LC-I	154	63.1
LC-II	18	7.3
LC-III	4	1.6
APC-I	4	1.6
APC- II	16	6.1
APC-III	4	1.6
VS	5	2.0
CM	10	4.0
Total	244	100.0

From above table it was observed that incidence of lateral compression type I fractures were maximum that was 62.7% (153 cases), which followed by APC II, LCII, combined mechanism (CM), APCIII, LCII and VS.

Table 8: Distribution according to tile's system of classification

Type	No. of cases	Incidence (%)
Unclassified	26	10.6
A1	3	1.2
A1,A2	4	1.6
A2	153	62.7
A2,A3	2	0.8
A3	2	0.8
B1	24	9.8
B2-1	4	1.6
B2-2	9	3.7
C1-1	2	0.8
C1-2	7	2.9
C1-3	1	0.4
C2	7	2.9
Total	244	100

From above table it was observed that the incidence of type - A (stable fractures) was maximum that was 68.4% (164 cases) which followed by Tile's type – B 15.41% (37 cases) and Tile's type – C 7.08% (17 cases)

Table 9: Distribution according to letournel and judet classification

Type	No. of cases	Incidence (%)
Unclassified	185	75.8
A	19	7.8
B	6	2.5
C	5	2.0
D	7	2.9
E	7	2.9
F	4	1.6
G	1	0.4
H	1	0.4
I	3	1.2
J	4	1.6
R-A/L-B	1	0.4
R-A/L-D	1	0.4
Total	244	100

From above table it was observe that incidence of acetabular fracture was 24.2 % (59 cases).

Table 10: Age Specific findings of young & Burgees Type

Type	AGE Median		Total
	<35	>35	
Unclassified	16 55.2%	13 44.8%	29 100.0%
LC-I	76 49.4%	78 50.6%	154 100.0%
LC-II	15 83.3%	3 16.7%	18 100.0%
LC-III	1 25.0%	3 75.0%	4 100.0%
APC-I	2 50.0%	2 50.0%	4 100.0%
APC- II	8 50.0%	8 50.0%	16 100.0%
APC-III	1 25.0%	3 75.0%	4 100.0%
VS	2 40.0%	3 60.0%	5 100.0%
CM	9 90.0%	1 10.0%	10 100.0%
Total	130 53.3%	114 46.7%	244 100.0%

1. From above table it is observed that 63.11% (154 cases) were LC-I (Lateral Compression type - I) which followed by LC-II (18 cases) and APC – II (15 cases).
2. In LC-I (63.11%), 49.4% cases (76 patients) were < 35 yrs of age group and 50.6% cases (78 patients) were >35 age group.
3. From the above table, the fact came forward that 29 patients (11.88%) were not classified in young and burgess type either these fractures were ilium avulsion/ischium avulsion or isolated acetabular fracture.
4. As per observation, it was clear that severity of fractures is inversely proportionate to incidence of that type of fracture. So as the severity of fracture increased, incidence of that type of fracture will decreased.

Incidence of specific type of pelvic fracture (I) ∝ 1/Severity of that type of pelvic fracture (S)

Severe type indentified in Young Burgees Classification were found largely associated with higher age group (>35 yrs of age). (P<0.05). The cases of low severity were seen with lower age group (<35 yrs of age group). However, cases of combined mechanism (CM) were also seen with lower age cohart that was statistically significant. (P<0.05).

Table 11: Age Specific findings of tile's classification

Type	AGE Median		Total
	<35	>35	
Unclassified	15 57.7%	11 42.3%	26 100.0%
A1	1 33.3%	2 66.7%	3 100.0%
A1,A2	4 100.0%	0 0.0%	4 100.0%
A2	73 47.7%	80 52.3%	153 100.0%
A2,A3	2 100.0%	0 0.0%	2 100.0%
A3	2 100.0%	0 0.0%	2 100.0%
B1	10 41.7%	14 58.3%	24 100.0%
B2	1 100.0%	0 0.0%	1 100.0%
B2-1	2 66.7%	1 33.3%	3 100.0%
B2-2	8 88.9%	1 11.1%	9 100.0%
C1-1	2 100.0%	0 0.0%	2 100.0%
C1-2	4 57.1%	3 42.9%	7 100.0%
C1-3	0 0.0%	1 100.0%	1 100.0%
C2	6 85.7%	1 14.3%	7 100.0%
Total	130 53.3%	114 46.7%	244 100.0%

1. From above table it was observed that 62.7% (154 cases) were Tie's type A2 which followed by Tile's type-B1(9.83%), and Tile's type – B2-2 and C1-2.0
2. In Tile's type A2 52.3% (80 cases) were > 35 yrs of age group and 47.7% (73 cases) were <35 age group.
3. From this table, the fact came forward that 26 patients (10.65%) were can not classified in Tile's classification, these fractures were isolated acetabular fracture.
4. As per observation, it was clear that severity of fractures is inversely proportionate to incidence of that type of fracture. So as the severity of fracture increased, incidence of that type of fracture will decreased.
5. It was observed that – Stable fracture (type – A) - 68.4% (164 cases) Partially stable (type – B) - 15.41% (37 cases) Completely unstable (type – C) -7.08 % (17 cases)
6. According to Tile's type majority of cases was seen with type-A2 and out of these 52.3% (80 cases) were >35 yrs of age group and 47.7% (73 cases) were <35 yrs of age group showing association of age.

Table 12: Sex wise findings of young & burgees classification

	SEX		Total
	M	F	
Unclassified	23 79.3%	6 20.7%	29 100.0%
APC- II	10 62.5%	6 37.5%	16 100.0%
APC-I	2 50.0%	2 50.0%	4 100.0%
APC-III	4 100.0%	0 0.0%	4 100.0%
CM	4 40.0%	6 60.0%	10 100.0%
LC-I	87 56.5%	67 43.5%	154 100.0%
LC-II	13 72.2%	5 27.8%	18 100.0%
LC-III	4 100.0%	0 0.0%	4 100.0%
VS	2 40.0%	3 60.0%	5 100.0%
Total	149 61.1%	95 38.9%	244 100.0%

1. From above table it was observed that 58.60% (126cases) were male patients and 41.39% (89 cases) were female patients, among the classified cases of Young & Burgees system.
2. Most of the studied severe types (APC III+LCIII+CM) were associated with male patients while cases of VS were showed higher proportion in female patients.
3. From above table, it was observed that 176 cases were (72.13 %) Lateral Compression type out of that 104 cases (59.1%) were male and 72 cases (40.9%) were female.

Table 13: Sex wise findings of Tile's Classification

	SEX		Total
	M	F	
Unclassified	20 76.9%	6 23.1%	26 100.0%
A1	3 100.0%	0 0.0%	3 100.0%
A1,A2	3 75.0%	1 25.0%	4 100.0%
A2	83 54.2%	70 45.8%	153 100.0%
A2,A3	2 100.0%	0 0.0%	2 100.0%
A3	2 100.0%	0 0.0%	2 100.0%
B1	19 79.2%	5 20.8%	24 100.0%
B2	1 100.0%	0 0.0%	1 100.0%
B2-1	3 100.0%	0 0.0%	3 100.0%
B2-2	6 66.7%	3 33.3%	9 100.0%
C1-1	2 100.0%	0 0.0%	2 100.0%
C1-2	2 28.6%	5 71.4%	7 100.0%

C1-3	0 0.0%	1 100.0%	1 100.0%
C2	3 42.9%	4 57.1%	7 100.0%
Total	149 61.1%	95 38.9%	244 100.0%

1. From above table it was observed that 59.17% (129 cases) were male patients and 40.87% (89 cases) were female patients among classified cases of Tile's system.
2. In Tile's type-A 164 cases were classified out of which 56.7% (93 cases) were male and 43.3% (71 cases) were female.
3. In Tile's type-B, 37 cases were classified out of that 78.4% (29 cases) were male and 21.62% (8 cases) were female.
4. In Tile's type-C, 17 cases were classified out of that 41.2% (7 cases) were male and 58.8% (10 cases) were female.
5. Statistically type-B was significantly associated with male patient and type-C was significantly associated with female cases. (P<0.05).

Conclusion

A study of 244 cases of fracture of pelvis is presented with particular references to variety of fractures and their statistical correlation to age, sex and nature of trauma.

Following conclusions were drawn from this study

1. This study was a male predominant study.
2. The increase of fracture of the pelvis is continuously increasing as these fractures were directly related to road side accident and industrialization.
3. The difference shows that the sex incidence was quite marked; male female ratio was 3:2.
4. The maximum number of cases (incidence) of pelvis fracture was accounted in the age group of 30-39 yrs of age. This age group is most active period of life and hence exposure to trauma is high.
5. Most common mode of trauma was road side accident followed by fall from height.
6. Fracture of pubic segment were the most common fracture among the pelvic fractures.
7. Fracture of pelvis were frequently associated with other body injury being the most common was lower limb fractures, the upper limb fractures and then urethral injury.

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