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A Study on Morbidity Patterns amongst Hospitalized Patients Attending a New Tertiary Care Institute, India

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ABSTRACT

Background: The pattern of morbidity reflects the burden of disease in a particular community. This pattern shows geographic variations between communities and countries. The knowledge of the pattern of diseases in a given country is very important in evaluating its health care delivery system. Such knowledge is important for health planning and for improving the healthcare services in that particular nation. We set out to study the morbidity pattern in our medical wards. **Materials and methods:** This is a retrospective study that reviewed the causes of morbidity amongst admitted cases from January 2014 to December 2014. The data were obtained from the medical record section. Data were analyzed using software Statistical Package for Social Sciences (SPSS) version 16. **Results:** A total of 19,609 patients were admitted during the study period. Of these males were 10,556 (53.8%) and females were 9,053 (46.2%). Out of the total cases, 19203 patients (97.9%) were discharged or relieved as cured, 210 patients (1.1%) had expired. The sex ratio was 858 females to 1,000 males. Of the most common causes of morbidities/system involved (ICD.10) in males, chronic ischemic heart disease (4.7%) was the leading cause followed by live born infants **(**3.8%), hypertension (3.7%), lymphoid leukemia (2.7%) and malignant neoplasm of brain (2.1%). In females, malignant neoplasm of breast (6.2%) was the leading cause followed by delivery by caesarean section (4.9%), live born infants **(**3.8%), secondary malignant neoplasm of other and unspecified sites (3.1%) and hypertension (2.4%). Overall bed occupancy rate (BOR) for all patients was 66.8 percent. **Conclusion:** Morbidity in the medical wards reflects the emerging trend of mixed disease spectrum burden comprising communicable and non-communicable diseases. Public health education, raising the socio-economic status of our people and as well as improving the standards of our health care facilities and personnel can contribute towards bringing down morbidity and mortality rates from medical wards.

Keywords: BOR, Morbidity pattern, System disorders

Introduction

India is a large country with huge variations in health indicators across states and districts of the country[1]. Unlike other big nations, for instance Russia, China and the USA, the Indian population consists of many communities with different cultures and habits and widely varying literacy rates. The morbidity and mortality pattern across India varies significantly as would be expected from the wide health and health determinant disparity spread across length and breadth of India [2, 3]. Expectation of life at birth for males and

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females has increased in recent years. In India, it is projected as 67 years in 2011-16 for males and 69 years for females. A projection beyond 2016 made by United Nations[4] has indicated that 21 % of the Indian population will be 60+ by 2050 which was 6.8% in 1991.

The Gurgaon district of Haryana state is surrounded by Delhi and Rajasthan. Over the past 25 years the city has undergone rapid development and construction. Gurgaon is one of Delhi's four major satellite cities and is part of the National Capital Region. It is within commuting distance of Delhi via an expressway and Delhi Metro. Gurgaon is the second largest city in the Indian State of Haryana and is the industrial and financial center of Haryana. It has the 3rd highest per capita income in India after Chandigarh and Mumbai. Gurgaon is also the only Indian city to have successfully distributed electricity connections to all its households. In 2011, Gurgaon had population of 1,514,432 of which male and female were 816,690 and 697,742 respectively with a sex ratio of 854 females per 1000 males. There was an upward change of 73.96 percent in the population compared to population as per 2001[5]. Fortis Memorial Research Institute, Gurgaon (FMRI) started clinical services on July 2012 and was officially inaugurated on 1st May 2013. With the goal to dispense modern tertiary health care to the community in a compassionate, professional and distinctive way, FMRI endeavors to be the health ultimate care destination for Asia-Pacific and beyond. Covering an area of 11 acres with a vision to develop1000 beds, the hospital brings together an outstanding pool of doctors, assistants and medical staff to treat patients. The institute integrates modern and traditional forms of medicine to dispense accessible and affordable health care.

Materials and Methods

Study Population: A retrospective study was conducted amongst admitted cases in all wards of all departments from January 2014 to December 2014 at FMRI. The hospital bed strength is 265. The data entry on morbidity and mortality of all patients is routinely done by the medical records section. This data has information on socio demographic, age, sex, diagnosis, treatment, prognosis of the disease condition at discharge and cause of death etc. as recorded in the case records by the clinicians. Records of patients with missing information of demographic data and diagnosis were excluded from the study. For multiple diagnoses, morbidity with the longest duration or the final diagnosis (supported by relevant laboratory investigations) was recorded as primary illness for the patient. All the information collected was cross-checked for completeness of the data from the records available at hospital (viz- patient's admission file, reports and ward registers, etc.). The World Health Organization (WHO) standards were used for analyzing and comparing the data. The abstracted data is coded by using manual of International Statistical Classification of Disease and Related Health Problems, 10th Revision, Volume 1, 2 and 3, published by the World Health Organisation, Geneva, 2010 Edition [6-8]. Quality control of information is maintained through the use of data processing, editing techniques, case finding audits and reviews of coded and abstracted data. Validity checks were carried out on all the variables and records with missing values and impossible codes were checked against the original files and corrected. Finally a series of checks of diagnosis versus sex and age etc. were carried out to detect the coding or typing errors. The present study only highlights the status of different types of morbidities in a tertiary care hospital. This is the first study in this hospital amongst admitted patients of all age group with all causes of morbidity to highlights the morbidity pattern.

Statistical analysis

Collected data were entered in Microsoft Excel and the results generated were analyzed using software Statistical Package for Social Sciences (SPSS) version 16.0. Descriptive statistical measures such as percentage, mean, and standard deviation were applied. Inferential statistical tests such as Z- test and Chi-square test were applied to identify important relationships between variables to determine the level of significance. A p-value of < 0.05 was considered statistically significant.

Results

During the year 2014 in FMRI a total of 19,609 patients were admitted in all wards from all departments i.e. from 1st January 2014 to 31st December 2014 of these, 14,314 (73.0%) were Indian citizens and the remaining 5,295 (27.0%) were from other countries (Table 1, Fig.1). Out of the 19,609 cases, males were 10,556 (53.8%) and females were 9,053 (46.2%). The sex ratio was 858 females to 1,000 males. The median age for all patients was for males 39.4 years, females 40.5 years. A statistically significant association was found among the Indian and other countries by sex at 5 percent level.

Table 1: Distribution of admitted cases by Indian states and Other Countries, Year-2014

Geographical area		Male	Female	Total	%(Total cases)	No. of Indian states/Other countries	Chi Square Value
India	No.	7,402	6,912	14,314	73.0	29	Statistically Significant at (p<0.05)
	%	51.7	48.3	100.0			
Other countries	No.	3,154	2,141	5,295	27.0	104	
	%	59.6	40.4	100.0			
Total	No.	10,556	9,053	19,609			
	%	53.8	46.2	100.0			

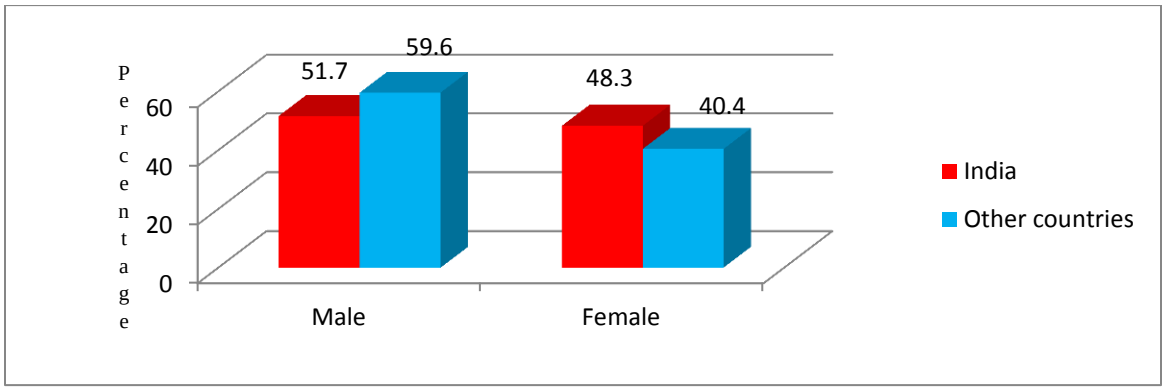

Fig 1: Percentage of patients admitted among India and other countries by sex

Table 2 and 3 give the break-up of leading number of cases registered according to Indian states they came from and the nationalities by place of residence and sex. Out of the total; 14,314 Indian patients who came from 29 Indian states, males were 7,402 (51.7%) and females were 6,912 (48.3%) with a sex ratio of 934 females to 1,000 to males. The median age for male patients was 39.5 years and 40.3 years in females. Majority of the patients came from nearby states Haryana (61.7%) followed by Delhi (19.6%), Uttar Pradesh (7.2%), Rajasthan (4.2%), Jammu & Kashmir (1.4%), Punjab (1.2%), Madhya Pradesh (1.0%), Assam (0.9%), Bihar (0.7%) and Uttarakhand (0.6%) (Fig. 2).

Of the remaining 5295 patients, who came from foreign 104 other countries, males were 3154 (59.6%) and females were 249 (40.4%) with a sex ratio of 679 females to 1,000 males. The median age for male patients was 39.4 years and 41.0 years in females. Maximum number of patients that came to Fortis hospital for taking treatment were from Iraq (57.4%) followed by Afghanistan (8.1%), Nigeria (6.1%), Kazakhstan (3.9%), Congo (3.6%), Uzbekistan (2.8%), Kenya (2.5%), Yemen (1.6%), Japan (1.4%) and Russia (1.2%) respectively (Fig.3).

Table 2: Leading number of Indian cases admitted at FMRI by place of residence and sex

Rank	Indian States	Male	Female	Total	%
1	Haryana	4361	4464	8825	61.7
2	Delhi	1394	1409	2803	19.6
3	Uttar Pradesh	607	430	1037	7.2
4	Rajasthan	438	166	604	4.2
5	Jammu &Kashmir	116	83	199	1.4
6	Punjab	101	77	178	1.2

7	Madhya Pradesh	67	71	138	1.0
8	Assam	72	53	125	0.9
9	Bihar	77	30	107	0.7
10	Uttaranchal	45	39	84	0.6

Table 3: Leading number of other countries patients admitted at FMRI by place of residence and sex

Rank	Other Country	Male	Female	Total	%
1	Iraq	1864	1174	3038	57.4
2	Afghanistan	270	160	430	8.1
3	Nigeria	180	145	325	6.1
4	Kazakhstan	115	92	207	3.9
5	Congo	104	87	191	3.6
6	Uzbekistan	84	62	146	2.8
7	Kenya	92	39	131	2.5
8	Yemen	48	38	86	1.6
9	Japan	52	23	75	1.4
10	Russia	27	35	62	1.2

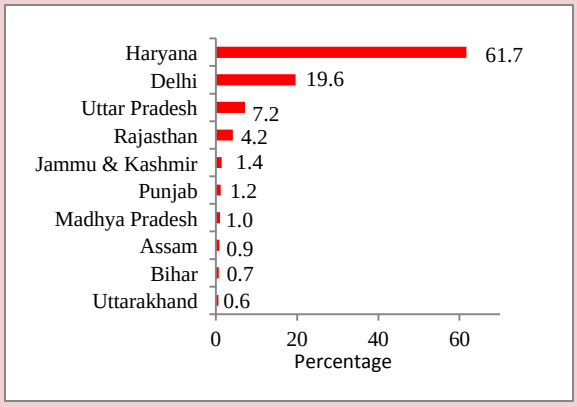

Fig 2: Leading number of cases registered from Indian states

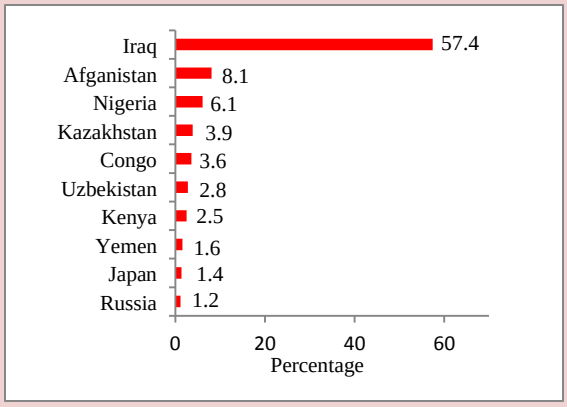

Fig 3:Leading number of cases registered from other countries

Table 4 shows the distribution of these cases as per age and sex for both Indian and other countries. Fig 4 shows the comparison of proportions between the age composition of each group among the Indian and other countries. The age specific proportions by sex were found to increase with age. The age specific percentages for men and women however were quite distinct. It is observed that the percentage of morbidity was much higher in infants (less than one year) in both sexes among Indian scenarios population in comparison of other countries and also in female's age group of 25-29 and 30-34 years.

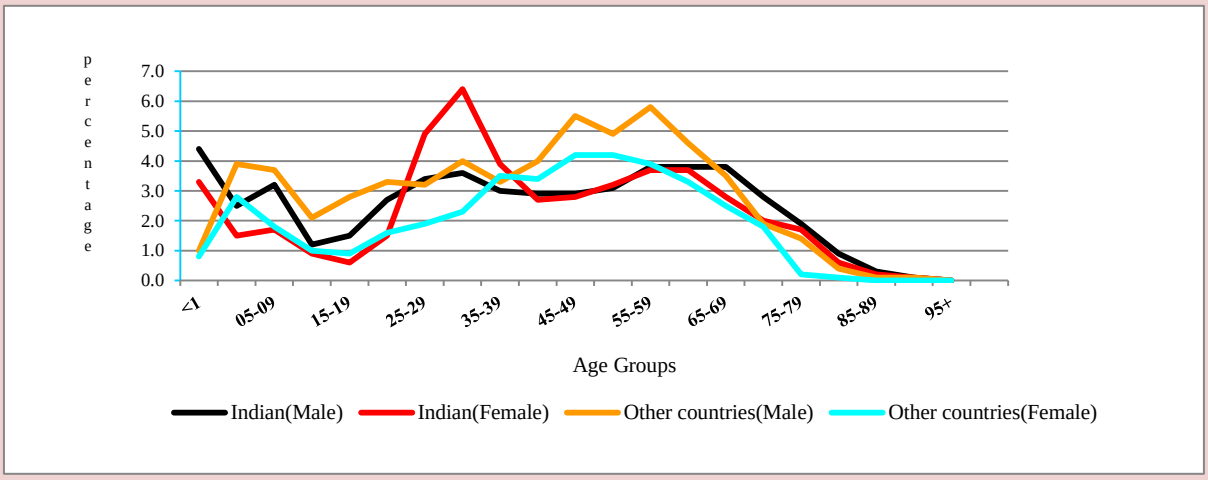

Fig 4: Age-specific proportions for all causes of morbidity among Indian states and other countries by sex

It is observed that the percentage of morbidity was much higher in the paediatric age group (0-14 years), young adults (15-34 years) and geriatric age (65+ years) in both sexes in the Indian group of patients as compared to the other countries group. Middle adults (35-64 years) of other countries have higher percentage of morbidity in comparison to the Indian patients (Fig.5 and Fig 6). A statistically significant association was found among in all age groups of Indian and other countries cases for both sexes at 5 percent level.

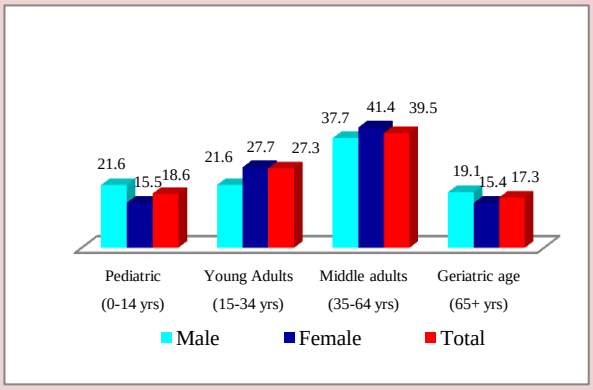

Fig 5: Age group wise distribution of Indian cases by sex

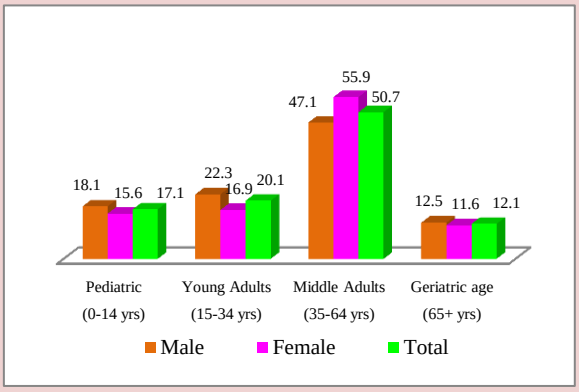

Fig 6: Age group wise distribution of other countries cases by sex

Table 4: Number and proportion of cases by age and sex, Indian State & Other countries

Age Groups	India				Other Countries				Chi- square statistic	
	Male	%	Female	%	Male	%	Female	%	Male	Female
<1	627	4.4	477	3.3	55	1.0	40	0.8		
1-4	352	2.5	219	1.5	209	3.9	147	2.8	182.8795. *p*-value is <0.00001. Significant at *p*<0.05	133.5757. *p*-value is <0.00001. Significant at *p*<0.05
5-9	454	3.2	250	1.7	198	3.7	97	1.8		
10-14	165	1.2	123	0.9	109	2.1	51	1.0		
Total (0-14 yrs)	*1598*	*11.2*	*1069*	*7.5*	*571*	*10.8*	*335*	*6.3*		
Mean age	*4.5*		*4.3*		*5.6*		*5.0*			
15-19	209	1.5	90	0.6	147	2.8	49	0.9		
20-24	386	2.7	220	1.5	173	3.3	86	1.6	26.5033. *p*-value is <0.00001. Significant at *p*<0.05	90.6215. *p*-value is <0.00001. Significant at *p*<0.05
25-29	486	3.4	695	4.9	172	3.2	102	1.9		
30-34	519	3.6	909	6.4	210	4.0	124	2.3		
Total (15-34 yrs)	*1600*	*11.2*	*1914*	*13.4*	*702*	*13.3*	*361*	*6.8*		
Mean Age	*26.1*		*28.2*		*25.2*		*26.2*			
35-39	423	3.0	564	3.9	177	3.3	183	3.5		
40-44	420	2.9	392	2.7	213	4.0	182	3.4	16.6878. *p*-value is 0.000238. Significant at *p*<0.05	21.8818, *p*-value is 0.000018. Significant at *p*<0.05
45-49	418	2.9	399	2.8	289	5.5	224	4.2		
50-54	441	3.1	457	3.2	257	4.9	223	4.2		
55-59	537	3.8	528	3.7	308	5.8	209	3.9		
60-64	551	3.8	523	3.7	243	4.6	175	3.3		
Total (35-65 yrs)	*2790*	*19.5*	*2863*	*20.1*	*1487*	*28.1*	*1196*	*22.6*		
Mean Age	*50.4*		*49.7*		*50.5*		*49.6*			
65-69	545	3.8	404	2.8	186	3.5	131	2.5		
70-74	407	2.8	282	2.0	103	1.9	96	1.8	8.1605. *p*-value is 0.016903. Significant at *p*<0.05	16.9524, *p*-value is 0.000038. Significant at *p*<0.05
75-79	266	1.9	245	1.7	75	1.4	13	0.2		
80-84	130	0.9	91	0.6	22	0.4	7	0.1		
85-89	50	0.3	33	0.2	4	0.1	2	0.0		
90-94	10	0.1	10	0.1	4	0.1	0	0.0		
95+	6	0.0	1	0.0	0	0.0	0	0.0		
Total (65-95+ yrs)	*1414*	*9.8*	*1066*	*7.4*	*394*	*7.4*	*249*	*4.7*		
Total (All Ages)	*7402*	*51.7*	*6912*	*48.3*	*3154*	*59.6*	*2141*	*40.4*	95.9344. Significant at *p*<0.05	
Mean Age (0-95 yrs)	*39.5*		*40.3*		*39.4*		*41.0*			

Table 5 provides the distribution of common causes of morbidities/system involved by sex for India and other countries respectively. In males, chronic ischemic heart disease (ICD:I25; n=495, 4.7%) was the leading cause followed by live born infants **(**ICD:Z38, n=396, 3.8%), hypertension (ICD:I10; n=392, 3.7%), lymphoid leukemia (ICD:C91; n=287, 2.7%), malignant neoplasm of brain (ICD:C71; n=220, 2.1%), type 2 diabetes mellitus (ICD:E11; n=173, 1.6%), malignant neoplasm of bronchus and lung (ICD:C34; n=171, 1.6%), other intervertebral disc disorders (ICD:M51; n=154, 1.5%), gastroenteritis and colitis (ICD:A09; n=152, 1.4%) and convulsions, not elsewhere classified (ICD:R56; n=152, 1.4%). In females, malignant neoplasm of breast (ICD:C50; n=564, 6.2%) was the leading cause followed by delivery by caesarean section (ICD:O82; n=442, 4.9%), live born infants **(**ICD:Z38; n=348, 3.8%), secondary malignant neoplasm of other and unspecified sites(ICD:C79; n=279, 3.1%),

hypertension (ICD:I10; n=215, 2.4%), malignant neoplasm of ovary (ICD:C56; n=188, 2.1%), lymphoid leukemia (ICD:C91; n=187, 2.1%), female infertility (ICD:N97; n=186, 2.1%), gastroenteritis and colitis (ICD:A09; n=146, 1.6%) and malignant neoplasm of cervix uteri (ICD:C53; n=137, 1.5%) (Fig.7 & 8). Gastroenteritis and colitis, lymphoid leukemia, hypertension and live born infants are the common leading causes of morbidity among both sexes.

Table 5: Leading causes of morbidities/system involved by sex (India & other countries)

Rank	Male				Female			
	ICD.10	System involved	No.	%	ICD.10	System involved	No.	%
1	I25	Chronic ischemic heart disease	495	4.7	C50	Malignant neoplasm of breast	564	6.2
2	Z38	Live born infants	396	3.8	O82	delivery by caesarean section	442	4.9
3	I10	Hypertension	392	3.7	Z38	Live born infants),	348	3.8
4	C91	Lymphoid leukemia	287	2.7	C79	Secondary malignant neoplasm of other and unspecified sites	279	3.1
5	C71	Malignant neoplasm of brain	220	2.1	I10	Hypertension	215	2.4
6	E11	Type 2 diabetes mellitus	173	1.6	C56	Malignant neoplasm of ovary	188	2.1
7	C34	Malignant neoplasm of bronchus and lung	171	1.6	C91	Lymphoid leukemia	187	2.1
8	M51	Other intervertebral disc disorders	154	1.5	N97	Female infertility	186	2.1
9	A09	Gastroenteritis and colitis	152	1.4	A09	Gastroenteritis and colitis	146	1.6
10	R56	Convulsions, not elsewhere classified	152	1.4	C53	Malignant neoplasm of cervix uteri	137	1.5

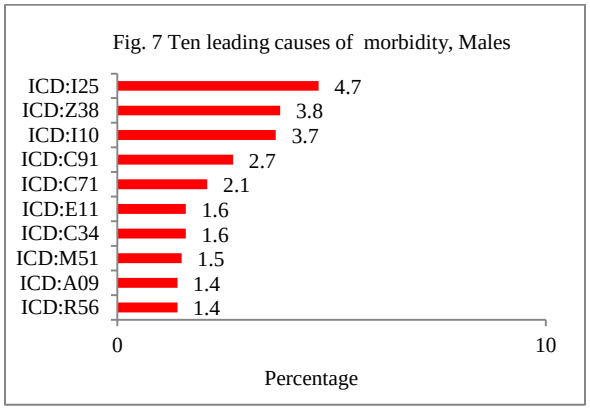

Fig 7: Ten leading causes of morbidity among (Indian & other countries), Males

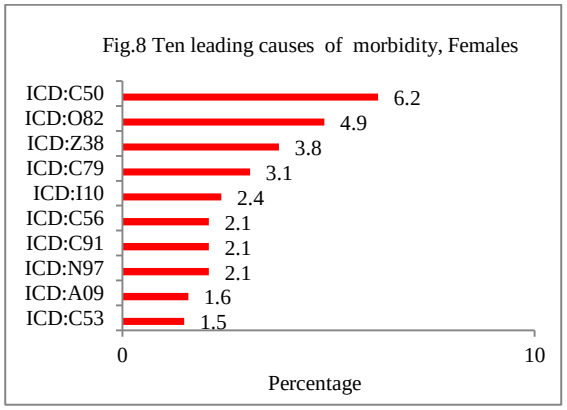

Fig 8: Ten leading causes of morbidity among (Indian & other countries), Females

Table 6 depicts the distribution of highest percentage of morbidity causes (ICD.10) by sex in India and other countries. A total of 19,609 new patients were admitted at FMRI within the period under review. Out of these, 3573(18.2%) were paediatric cases (aged 0-14 years) made up of 11.1% (n=2169) boys and 7.2% (n=1404) girls. The highest percentage of morbidity cause among boys were live born infants less than1 year (Z38; n= 396, 18.3%) and in girls (Z38; n= 347, 24.7%) followed by lymphoid leukemia (boys: C91; n=184,

8.5%, girls: C91; n=169, 12.0%) and congenital malformation (boys:Q21; n=101, 4.7%, girls: Q24; n=73, 5.3%)

Number of young adults (15-34 years) was 4577 constituted (23.3%) made up 11.7% (n=2302) males and 11.6% (n=2275) females. The highest percentage of morbidity cause among males were malignant neoplasm of brain (C71; n=88, 3.8%) followed by lymphoid leukaemia (C91; n=77, 3.3%) and dengue fever (A90; n=69, 3.0%). In females, the highest percentage of morbidity cause were delivery by caesarean section (O82; n=345, 15.2%) followed by female infertility (N97; n= 112, 4.9%) and spontaneous delivery (O80; n= 106, 4.7%).

Middle age adults (35-64 years) constituted 8336 (42.5%) made up of 4277 males and 4059 females (21.8% and 20.7% respectively). The highest percentage of morbidity cause among males was chronic ischaemic heart disease (ICD.10: I25; n=341, 8.0%) followed by essential (primary) hypertension (ICD: I10; n =234, 3.3%) and type 2 diabetes mellitus (ICD: E11; n=117, 2.7%). In females, the highest percentage of morbidity cause was malignant neoplasm of breast (ICD.10:C50; n=441, 10.9%) followed by secondary malignant neoplasm of other and unspecified sites (ICD.10:C79; n=215, 5.3%) and malignant neoplasm of cervix uteri (ICD.10:C53; n= 117, 2.9%).

Geriatric age (65+ years) constituted 3123 (15.9%) made up 9.2% (n=1808) males and 6.7% (n=1315) females. The highest percentage of morbidity cause among males was chronic ischaemic heart disease (I25; n=137, 7.6%) followed by hypertension (I10; n=128, 7.1%) and malignant neoplasm of bronchus and lung (C34; n=81, 4.5%). In females, the highest percentage of morbidity cause was malignant neoplasm of breast (C50; n=110, 8.4%) followed by hypertension (I10; n=97, 7.4%) and malignant neoplasm of ovary (C56; n= 66, 5.0%).

Table 6: The highest % of morbidity causes (ICD.10) by ages and sex (Indian and other countries)

Age Groups	Rank	Males				Females			
		ICD.10	Diseases	No.	%	ICD.10	Disease	No.	%
Pediatrics age (0-14yrs)	1	Z38	Live born infants	396	18.3	Z38	Live born infants	347	24.7
	2	C91	Lymphoid leukaemia	184	8.5	C91	Lymphoid leukaemia	169	12.0
	3	Q21	Cong. Malformation of cardiac septa	101	4.7	Q24	Cong. Malformation of heart	73	5.3
Young adults (15-34yrs)	1	C71	Malignant neoplasm of brain	88	3.8	O82	Delivery by caesarean section	345	15.2
	2	C91	Lymphoid leukaemia	77	3.3	N97	Female infertility	112	4.9
	3	A90	Dengue fever (classical dengue)	69	3.0	O80	Spontaneous delivery	106	4.7
Middle age adults (35-64yrs)	1	I25	Chronic ischaemic heart disease	341	8.0	C50	Malignant neoplasm of breast	441	10.9
	2	I10	Hypertension	234	3.3	C79	Secondary malignant neoplasm of other and unspecified sites	215	5.3
	3	E11	Type 2 diabetes mellitus	117	2.7	C53	Malignant neoplasm of cervix uteri	117	2.9
Geriatric age (65 + yrs)	1	I25	Chronic ischaemic heart disease	137	7.6	C50	Malignant neoplasm of breast	110	8.4
	2	I10	Hypertension	128	7.1	I10	Hypertension	97	7.4
	3	C34	Malignant neoplasm of bronchus and lung	81	4.5	C56	Malignant neoplasm of ovary	66	5.0

Month wise distribution of patients admitted at FMRI and bed occupancy rate for Indian cases and other countries are shown in Table7.The bed occupancy rate (BOR) for Indian cases was 45.5% and for other countries was 21.3%. For all cases (Indian and other countries) BOR was recorded as 66.8 percent throughout the year. A high BOR

(71.5%) for total cases was seen in the month of September (n= 1879, 81.1%) followed by January (n= 1481, 75.0%) and November (n= 1680, 70.0%).

Table 7: Month wise distribution of morbidity cases and Bed Occupancy Rate (BOR) for Indian cases and other countries

Months	Indian cases		Other countries		Total	
	Nos.	BOR (%)	Nos.	BOR (%)	Nos.	BOR (%)
January	1102	53.3	379	21.7	1481	75.0
February	1048	42.3	347	19.0	1395	61.3
March	1152	42.8	450	23.0	1602	65.8
April	1123	44.1	486	23.1	1609	67.3
May	1216	45	417	19.3	1633	67.9
June	1114	43.1	475	23.1	1589	66.2
July	1230	44.4	411	20.0	1641	64.4
August	1354	51.2	399	17.9	1753	69.1
September	1364	53.2	515	27.8	1879	81.1
October	1177	41.8	550	24.0	1727	65.8
November	1223	48.4	457	21.6	1680	70.0
December	1211	36.1	409	15.0	1620	51.1
Total	14314	45.5	5295	21.3	19609	66.8

Table 8 provides the distribution of seasonal variations among the morbidity, mortality, case fatality rate (CFR) and bed occupancy rate (BOR) for Indian cases and other countries. The climate in Gurgaon area cannot be differentiated into the conventional four seasons. A more practical demarcation is the winter months of December, January and February, the spring season months of March and April, the hot-dry period of May and June, the hot-wet monsoon (rainy) period of July, August and September and autumn comprising October and November. Out of the total admission (n= 19609), the high point in the frequency of morbidities was found in the hot-wet (n= 5273, 26.9%) season (July: 8.4%, August: 8.9% and September: 9.6% month) followed by winter (n= 4496, 22.9%) season (December: 8.3%, January: 7.5% and February: 7.1%). Overall case fatality rate was 1.10 (n=215) per 1000 population. A high (n= 58, 1.70 **%**) case fatality rate was seen in the autumn season (October: 1.33%, November: 2.08%) and followed by spring (n= 45, 1.40 %) season (March: 1.31% and April: 1.49%). While the overall BOR was 66.8 percent, the highest BOR (71.5%) was seen in the hot-wet season (July: 64.4%, August: 69.1% and September: 81.1%) followed by autumn (67.9%**)** season (October: 65.8%, November: 70.0%).

Table 8: Seasonal variations of morbidity cases, death cases, Case Fatality Rate (CFR) and Bed Occupancy Rate (Indian cases & Other Countries)

Months	Morbidity		Deaths		Case Fatality Rate (CFR) %	Bed Occupancy Rate (%)
	Nos.	%	Nos.	%		
Winter	***4496***	***22.9***	***43***	***20.0***	***0.96***	***62.5***
December	1620	8.3	13	6.1	0.80	51.1
January	1481	7.5	13	6.0	0.88	75.0
February	1395	7.1	17	7.9	1.22	61.3
Spring	***3211***	***16.4***	***45***	***20.9***	***1.40***	***66.6***
March	1602	8.2	21	9.8	1.31	65.8
April	1609	8.2	24	11.2	1.49	67.3
Hot-dry	***3222***	***16.4***	***29***	***13.5***	***0.90***	***67.0***
May	1633	8.3	12	5.6	1.49	67.9
June	1589	8.1	17	7.9	1.07	66.2
Hot-wet	***5273***	***26.9***	***40***	***18.6***	***0.76***	***71.5***
July	1641	8.4	14	6.5	0.85	64.4
August	1753	8.9	12	5.6	0.68	69.1
September	1879	9.6	14	6.5	0.75	81.1
Autumn	***3407***	***17.4***	***58***	***27.0***	***1.70***	***67.9***
October	1727	8.8	23	10.7	1.33	65.8
November	1680	8.6	35	16.3	2.08	70.0
Total	**19609**	**100.0**	**215**	**100.0**	**1.10**	**66.8**

Table 9 shows the distribution of patients according to condition at discharge for Indian cases and other countries. It was found that out of the total (n=19609) admitted cases in hospital among various wards, 19203 patients (97.9%) were discharged/relieved as cured, 210 (1.1%) expired, 163 (0.8%) left against medical advice (LAMA) and 20 (0.1%) patients left the hospital on own risk.

Table 9: Distribution of inpatients according to condition at discharge (Indian and other countries)

Condition at discharge	Number	%
Discharge/Relieved	19203	97.9
Expired	210	1.1
Left Against Medical Advice	163	0.8
Left on own risk	20	0.1
NR	13	0.1
Total	19609	100.0

Table 10 depicts the morbidity pattern of diseases among Indian patients and patients from other countries admitted in this tertiary care hospital. The leading cause of morbidity was neoplasms [ICD.10:(C00-D48), n=5513 (28.1%)] and statistically significant association was seen between Indian cases and other countries cases followed by diseases of circulatory system [ICD.10:(I00-I99), n=2055 (10.5%)], and diseases of the genitourinary system [ICD.10: N00-N99), n=1554 (7.9%)] and a statistically significant association was seen among Indian cases and other countries cases.

Table 10: Number and proportion of morbidity categories/system involved (ICD.10)by sex (India and other countries)

S. N.	ICD.10	Diseases of the system involved	Indians				Other Countries				Indians and other countries				Chi square value
			Male	Fem	Total	%	Male	Fem	Total	%	Male	Fem	Total	%	
1	(A00-B99)	Certain infectious and parasitic	395	271	666	4.7	80	64	144	2.7	475	335	810	4.1	0.406885 Not Sig.
2	(C00-D48)	Neoplasms	1823	1958	3781	26.4	978	754	1732	32.7	2801	2712	5513	28.1	32.3618 Stat. Sig. p<0.05
3	(D50-D89)	Blood and blood-forming organs and certain disorders involving the immune mechanism	219	71	290	2.0	49	37	86	1.6	268	108	376	1.9	0.000846 Stat. Sig. p<0.05
4	(E00-E90)	Endocrine, nutritional and metabolic	234	211	445	3.1	117	60	177	3.3	351	271	622	3.2	0.002157 Stat. Sig. p<0.05
5	(F00-F99)	Mental and behavioral disorders	9	12	21	0.1	10	4	14	0.3	19	16	35	0.2	0.166194 Not Sig.
6	(G00-G99)	Diseases of the nervous system	280	166	446	3.1	106	88	194	3.7	386	254	640	3.3	0.053018 Not Sig.
7	(H00-H59)	Diseases of the eye and adnexa	113	115	228	1.6	62	17	79	1.5	175	132	307	1.6	0.000008 Stat. Sig. p <0 .05
8	(H60-H95)	Ear and mastoid process	37	29	66	0.5	26	12	38	0.7	63	41	104	0.5	0.214204 Not Sig. p <0.05
9	(I00-I99)	Diseases of the circulatory system	1029	476	1505	10.5	395	155	550	10.4	1424	631	2055	10.5	0.13377 Not Sig.
10	(J00-J99)	Diseases of the respiratory system	320	188	508	3.6	124	44	168	3.2	444	232	676	3.4	0.010466 Stat. Sig. at p <0.05
11	(K00-K93)	Diseases of the digestive system	466	327	793	5.5	129	67	196	3.7	595	394	989	5.0	0.070945 NS
12	(L00-L99)	Skin and subcutaneous tissue	76	45	121	0.8	32	18	50	0.9	108	63	171	0.9	0.883331 Not Sig.
13	(M00-M99)	Musculoskeletal system and connective tissue	252	262	514	3.6	328	292	620	11.7	580	554	1134	5.8	0.193648 Not Sig.at p < 0.05
14	(N00-N99)	Genitourinary system	454	708	1162	8.1	222	170	392	7.4	676	878	1554	7.9	36.7836 Stat. Sig. p <0.05
15	(O00-O99)	Pregnancy, childbirth puerperium	3	990	993	6.9	1	56	57	1.1	4	1046	1050	5.4	0.200355 Not Sig.
16	(P00-P96)	conditions originating in the perinatal	52	61	113	0.8	2	1	3	0.1	54	62	116	0.6	0.59712 Not Sig.
17	(Q00-Q99)	Congenital malf., deformations and chromosomal abnormalities	240	121	361	2.5	200	140	340	6.4	440	261	701	3.6	0.036058 Stat. Sig. p < 0.05
18	(R00-R99)	Symptoms, signs and abnormal clinical and laboratory findings, not elsewhere classified	372	251	623	4.4	78	62	140	2.6	450	313	763	3.9	0.384975 Not Sig.
19	(S00-T98)	Injury, poisoning and certain other consequences of external causes	407	175	582	4.1	107	52	159	3.0	514	227	741	3.8	0.522856 Not Sig.

20	(V01-Y98)	External causes of morb. and mortality	14	7	21	0.1	5	0	5	0.1	19	7	26	0.1	Condition not full filled
21	(Z00-Z99)	Factors influencing health status and contact with health services	600	463	1063	7.4	101	48	149	2.8	701	511	1212	6.2	0.008654 Stat. Sig. $p < 0.05$.
All Categories:ICD.10:A00-Z99			7402	6912	14314	100.0	3154	2141	5295	100.0	10556	9053	19609	100.0	Stat. Sig. $p < 0.05$.
		%	**51.7**	**48.3**	**100.0**		**59.6**	**40.4**	**100.0**		**53.8**	**46.2**	**100.0**		

Discussion

This analysis was limited to hospital admissions only, which did not include patients seen in the emergency and outpatients departments (OPD) per se. Nevertheless, similar results would be expected if OPD patients were to be included, since most of them present there for post-hospitalization follow-up, although some patients with more acute problems are referred directly to the OPD. The present study only highlights the status of different types of morbidities, mortalities and bed occupancy rate in a new tertiary health care institute. The present study explored spectrum of all diseases (communicable and non-communicable) in all departments/wards. The leading cause of morbidity was neoplasms [(C00-D48), n=5513 (28.1%)] and statistically significant association was seen among Indian cases and other countries cases followed by diseases of circulatory system [(I00-I99), n=2055 (10.5%)], and diseases of the genitourinary system [(N00-N99), n=1554 (7.9%)] and a statistically significant association was seen among Indian cases and other countries cases. The leading causes of morbidity in males were symptoms, signs and abnormal clinical and laboratory findings (28.6%) followed by infectious parasitic disease (16.8%)[9]. Predominant cause of morbidity in boys was bacterial infection (35.8%); girls (38.8%) followed by disease of sign and symptoms (28.0%); girls (29.8%); diseases of respiratory infection [n=271 (8.0%)[10]. According to a study conducted among cancer patients by Tyagi BB, B K Mohanti *et al*.[11], the most common cause of morbidity in males was cancer of the brain and nervous system (11.4%) followed by cancer of lung, and in females, breast cancer (31.5%) was the leading cause followed by brain and nervous system cancer (8.7%). Our study shows that 18.2% were paediatric cases(aged 0-14 years), the leading cause of morbidity cause among boys were live born infants less than1 year (Z38; n= 396, 18.3%) and in girls (Z38; n= 347, 24.7%) followed by lymphoid leukemia (boys: C91; n=184, 8.5%, girls: C91; n=169, 12.0%) and congenital malformation (boys: Q21; n=101, 4.7%, girls: Q24; n=73, 5.3%.) . A study conducted among primary school children [14], the major morbidities observed were dental caries (65.1%), upper respiratory tract infections (38.2%), ear wax (29.9%) and myopia (10.0%). Study conducted by Tyagi BB et al.[10] had reported that bacterial infection (37%) was the predominant cause of morbidity followed by the non-specific diseases with admission as per the sign and symptoms (28.7%), acute respiratory infection (8%), neoplasm and multiple organs effect (5.6%) and disease of digestive organs (2.8%). Similar results were reported by Ogbeide MI and Feacham RG [15, 16] Gastroenteritis, acute lower respiratory tract infection (ALRTI) and severe anemia are the most important causes of childhood morbidity and mortality in Benin City, Nigeria. Reports from other African countries also confirm the leading role of these preventable diseases as causes of childhood morbidity and mortality[17-20]. Our study showed that middle age adults (35-64 years) constituted 42.5% of the total cases. The highest percentage of morbidity cause among males was chronic ischaemic heart disease (ICD.10: I25; n=341, 8.0%) followed by hypertension (ICD: I10; n=234, 3.3%) and type 2 diabetes mellitus (ICD: E11; n=117, 2.7%). Among females, the highest percentage of morbidity cause was malignant neoplasm of breast (ICD.10:C50; n=441, 10.9%) followed by secondary malignant neoplasm of other and unspecified sites (ICD.10:C79; n=215, 5.3%) and malignant neoplasm of cervix uteri (ICD.10:C53; n= 117, 2.9%). Study by Udoh et al.[21] reported that 44.1% of the geriatric morbidity was due to communicable diseases while 55.9% were due to non-communicable diseases. The present study showed that high point in the frequency of morbidities was found in the hot-wet (n= 5273, 26.9%) season (July: 8.4%, August: 8.9% and September: 9.6% month) followed by winter (n= 4496, 22.9%) season (December: 8.3%, January: 7.5% and February: 7.1%). A study conducted by Sharma et. al.[22] had reported that most cases of ADDs (38.89%) and pulmonary tuberculosis

(4.68%) in summer, and typhoid (1.57%) and viral hepatitis (1.23%) in the monsoon season**.** Several other studies revealed that most episodes occurred during late monsoon season. This indicates that infection is a common underlying cause for acute illness in Sickle Cell Disease (SCD) in India. Further studies should evaluate the association with viral infections. Similar to our study, infection was the most common cause of hospitalization reported from Nigeria[23]**.** This may be due to poor socio-economic status and poor hygienic conditions which predispose the population infections. However, in a study conducted by NA Alkr, Adekilefrom Kuwait[24]**,** vaso-occlusive crisis was the most common cause of hospitalization in SCD children. Another study from central India has reported severe anaemia requiring blood transfusion as the most common cause of hospitalization in SCD children [25]**.** Maximum hospitalizations were seen during the late monsoon and early post monsoon season (August-October). This finding was similar to previous reports from India[26,27]. However, the studies from other countries have shown temperature[28] or high wind speed and low humidity as precipitating factors for vaso-occlusive crisis in SCD subjects but not rainfall[29]**.**A number of studies have attempted to assess the impact of social factors on health. A review by McGinnis et al. estimated that medical care was responsible for only 10%–15% of preventable mortality in the U.S.[30]while Mackenbach's studies suggest that this percentage may be an underestimate. They affirm the overwhelming importance of social factors[31,32]McGinnis and Foege concluded that half of all deaths in the U.S. involve behavioural causes[33];other evidence has shown that health-related behaviours are strongly shaped by social factors, including income, education, and employment[34,35] Jemal et al., studying 2001 U.S. death data, concluded that "potentially avoidable factors associated with lower educational status account for almost half of all deaths among working-age adults in the U.S.[36] Galea and colleagues conducted a meta-analysis, concluding that the number of U.S. deaths in 2000 attributable to low education, racial segregation, and low social support was comparable with the number of deaths attributable to myocardial infarction, cerebrovascular disease, and lung cancer, respectively[37]. The health impact of social factors also is supported by the strong and widely observed associations between a wide range of health indicators and measures of individuals' socioeconomic resources or social position, typically income, educational attainment, or rank in an occupational hierarchy. In U.S. as well as European data, this association often follows a stepwise gradient pattern, with health improving incrementally as social position rises. This stepwise gradient pattern was first noted in the United Kingdom[38, 39]. Our study shows that overall bed occupancy rate was 66.8 percent. In a study conducted by Haideret et al.[12], a higher bed occupancy rate (BOR) was reported at 118.51%. In a study conducted by Punja et al.**[**13] they observed that the beds are not available for all the patients and the patients are in queue to occupy the beds. Similar results were also observed by Tyagi BB; Aswal RS et al.**[9]** who reported bed occupancy rate to be 97.2 % and Tyagi BB, Haroon AS, Negi VK et al.[10] observed that BOR was 135.3% throughout the year. The present study shows that 97.9% patients that were discharged or relieved. Similar results were also reported by Tyagi BB et al.[9, 10] who found that the percentage of patients discharged /relieved were 75.6% and 86.4%.

In our study we have included a large number of diseases and not limited our scope to a single disease or system, which is unlike a number of studies dealing with a single disease or diseases limited to a particular system. To our knowledge, there are very few studies on morbidity pattern amongst admitted cases for all patients with all categories of diseases presenting in a tertiary hospital at national and international level. Feedback from this study will provide vital information to decision makers in setting priorities in health services reform in our sub region. We were unable to include the health impact of social factors as we did not collect these data points. However, in future we plan to incorporate this information also.

Conclusion

Consistent with other several studies in India and other countries, the findings of the present study shows that the morbidity in the medical wards reflects the emerging trend of mixed disease spectrum burden comprising communicable and non-communicable diseases. It will be helpful to public health education, raising the socio-economic status of our people and as well as improving the standards of our health care facilities and personnel can contribute towards bringing down morbidity and mortality rates from medical wards.

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Ethical approval

Specifying written permission for conducting the study was obtained prior to collecting the data.

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