

## **Epidemiological Profile and Mortality Pattern of Adolescents Admitted in Tertiary Level Teaching Hospital in North India**

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### **Abstract**

**Background:** Mortality pattern of hospitalized adolescents in developing countries has not been studied well so far. A better understanding of the adolescent mortality pattern could contribute to a more effective approach in saving these lives.

**Method:** In this retrospective study, data was collected from hospital registers and patients file records. The records of the adolescent patients, who died, in paediatrics medical wards of Kalawati Saran Children’s Hospital, from 1<sup>st</sup> January 2008 to 31<sup>st</sup> December 2012 were analyzed.

**Results:** The average admission rate through OPD (Out Patient Department) and emergency was 9.5% and 27.7% respectively. Adolescents contributed 12% of admission and 60% of them were male. Out of 11,028 deaths, 352 (3.2%) fatalities were from study group. Mean duration of hospitalization before death in acute and chronic illness was  $1.69 \pm 0.41$  and  $9.54 \pm 2.02$  days, respectively. One third of patients who died had chronic illness.

Menigoencephalitis (14%) was the leading cause of death followed closely by disseminated tuberculosis (13%) and hepatic encephalopathy (12%). Younger adolescents (10-14 years) had significantly higher mortality (OR= 2.22; 95% CI= 1.56-3.14). Similarly mortality differential remained significantly higher among the patients admitted through emergency (OR= 9.29; 95% CI= 8.72-9.89).

**Conclusion:** Communicable diseases are still the major killer in this age group too. The analysis of hospital admission and death pattern could help to prioritize the action and implementation of health policies and future planning.

**Keywords:** Adolescent, Health Care, Mortality

### **Introduction**

The World Health Organization (WHO) defines an adolescent as a person between the ages of 10 and 19 years [1]. Today there are 1.2 billion adolescents, worldwide and 230 millions in India [2]. While household surveys have improved the quality and

quantity of information about adolescents, no comprehensive studies of the baseline prevalence of the various disorders and the outcome of hospitalized patients of this age group are available, even though this group consists of around 22% of the India's population; 12% are in 10–14-year age group and 10% in the 15–19-year age group [2, 3].

Mortality data from the hospital reflect the causes of illnesses and care seeking behaviour of the community as well as the standard of care being provided. Hospital based death records provide information regarding the causes of deaths, case fatality rates, age and sex distribution, which are of great importance in planning health care services [4].

Kalawati Saran Children Hospital (KSCH) is a government owned tertiary level Pediatrics teaching hospital and referral centre with 375 beds, situated in the capital of India, New Delhi. It admits patients up to 18 years of age and caters mostly to the health care needs of low to middle class communities belong here and the rural parts of the neighboring states.

A better understanding of the adolescent mortality pattern could contribute to a more effective approach in providing improved patients care services. The present study aims at finding the proportion of adolescents' (10–18 years) admission in Pediatric medical ward, to assess adolescent mortality rate and to study the influence of age, sex and mode of admission on mortality.

### Methods

In this retrospective study, a detailed analysis was conducted with records of adolescent patients, who died, at Pediatric medical wards of KSCH, from 1<sup>st</sup> January 2008 to 31<sup>st</sup> December 2012. Adolescents admitted for surgical reason, brought dead and in whom, final diagnosis could not be ascertained were excluded. Data was collected from hospital registers and patients file

records. Duration of illness prior to hospitalization, mode of admission [whether from OPD (Outpatient Department) or emergency department (ED)], and period of hospitalization prior to death were also noted. Cause of death and nature of illness, whether chronic (has been present for more than three months or it will, very probably, last longer than three months, or it has occurred three times or more during the past year and will probably reoccur) [5] or acute among the patients who died, was also identified.

Influence of age, sex, mode of admission on death was studied. Prevalence of chronic illness and disease profile among the patients who died was also studied. Age was divided into two categories to capture the different stages of life course; young adolescent 10–14 and older adolescent 15–19 years. Crude Death Rate (CDR), defined as total deaths among the total admitted patients and Net Death Rate [(NDR) for hospital policy purpose defined as deaths occurring within 48 hours of admission in hospital] were also obtained.

The collected data was entered into Statistical Package for Social Sciences (SPSS) version 13 for windows. We used logistic regression to model the association between the mortality at the individual level. Odds ratios (OR) and predicted probabilities (PP) with 95% CI were calculated.

### Results

Among the total admitted patients, 18,705 (12%) patients were between 10 to 18 years. The average admission rate through OPD and emergency was 9.5% and 27.7%, respectively. Sixty percent's of admitted patients were male. Of the total 11,028 deaths during this period, adolescent mortality was 3.2%. (Fig1).

Mean duration of symptoms prior to admission for acute and chronic illnesses was  $4.3 \pm 0.42$  and  $52.63 \pm 11.70$  days, respectively. Similarly mean duration of

hospitalization before death in acute and chronic illness was  $1.69 \pm 0.41$  and  $9.54 \pm 2.02$  days, respectively. Half of total deaths occurred within 24 hours of admission.

Cause of death was coded as per the ICD 10<sup>th</sup> revision. One third of patients who died had chronic illness. Meningocephalitis (14%) was the leading cause of death followed closely by disseminated tuberculosis (13%) and hepatic encephalopathy (12%). Septicaemia (10%), pneumonia (10%), severe malaria (10%), Dengue shock syndrome (DSS) (4%), HIV/AIDS (3%), and Aplastic anemia (3%), were among other important causes.

We found higher mortality rate in the female adolescent patients however it was not statistically significant (OR= 1.21; 95% CI= 0.99-1.27). Younger adolescents have significantly higher mortality (OR= 2.22; 95% CI= 1.56-3.14). Similarly, mortality differential remained significantly higher among the patients admitted through emergency (OR= 9.29; 95% CI= 8.72-9.89).

Except in 2012 in which NRR increased due to surge in dengue cases, it was coming down from 3.8% in 2008 to 2.1% in 2011. Similarly, CDR has fallen from 9.8% in 2008 to 6.8% in 2012.

### Discussion

Most studies on mortality focus on under-five children and adults. Similarly, studies of mortality in late childhood have grouped data for children aged 5–14 years, without scope for analysis of changes in patterns of death before and after puberty [6].

In this retrospective analysis, number of admissions was more in males; similar finding has been documented in various studies [7]. This finding may reflect a gender bias in health seeking behaviour of our community.

Community based retrospective study of sex in infant mortality in India (2003) found that girls have higher mortality due to sex differentiation in dietary intake, nutritional status and health care [8].

However in our study it was statistically not significant.

Surge in adolescent death in 2010 and 2012 was due to severe malaria and DSS, respectively. Majority of deaths were caused by communicable diseases and to certain extent, they were preventable too.

In our study majority of the patients, who died were brought to our hospital after a prolonged duration of illness and a significant number of them came from remote areas. Measure to establish more health care centers, improved accessibility to health care facility and improved transport facilities could assist in reducing mortality.

We found significant difference in the number of deaths among adolescents when they were admitted through emergency as compared with OPD (13.5% vs. 1.6%). Delay in the seeking medical opinion has been cited as one of the reasons for preventable demise in the hospitalized patients [9].

Similarly case fatality rate was higher among young (10-14) adolescents when compared to older (15-19). This could be due to exclusion of suicidal, road traffic accident cases and maternal mortality cases which are more common among older age group [10].

In the last five years, the average crude death rate was 7.7%. It was lower than the studies carried out in other developing countries being 13.96% and 9.5%, respectively [11, 12]. One plausible explanation could be inclusion of older patient in our study.

Communicable diseases were predominant (80%), amongst the cause of deaths in our patients, and are higher compared to other studies of mortality of hospitalized patients [13, 14]. The reason for this could be poverty, wide spread health ignorance and lack of health awareness in our community.

Taking cognizance of the diverse nature of adolescent health needs, the government of India has initiated 'A

strategic Approach to Reproductive, Maternal, Newborn, Child and Adolescent Health (RMNCH+A) program. The priority under adolescent health includes nutrition, sexual and reproductive health, and mental health, addressing gender-based violence, non-communicable diseases and substance use [15].

But we still need to improve the peripheral health centers to focus more on preventive strategies, to improve health seeking behaviour of our communities and to strengthen the referral facilities.

Serving a sizeable number of patients, evaluation of characteristics of those who come in this hospital could give an insight into illnesses and mortality pattern with certain acuity. This finding also indicates that monitoring and registering epidemics and spread of leading infectious diseases or disease patterns (malaria, tuberculosis, human immunodeficiency virus (HIV)/acquired immunodeficiency syndrome (AIDS), Dengue Fever, and so forth) needs considerable improvement. It is therefore necessary to invest in adolescents as they are the future leaders and guardians of the nation's development.

#### Contributors

MA reviewed the patients' case files/ records, collected the data and drafted the article. HKP and JC critically reviewed the article. Both the authors approved the final version of the article.

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**Legend Figure**

