Traumatic brain injury epidemiology

see also Severe Traumatic Brain Injury Epidemiology.

Traumatic brain injury (TBI) affects over 48 million people worldwide each year.

56–60 % of patients with GCS score ≤8 have 1 or more other organ systems injured. 25% have “surgical” lesions [1].

There is a 4–5% incidence of associated spine fractures with significant head injury (mostly C1 to C3).

Traumatic brain injury (TBI) is a critical public health and socio-economic problem throughout the world, making epidemiological monitoring of incidence, prevalence and outcome necessary.

It is one of leading causes of mortality and disability worldwide and is estimated to surpass many diseases by 2020 [2] [3].

It is the leading cause of mortality and morbidity in children [4].

Nonaccidental head injury, as seen in domestic child abuse cases, is often associated with spine injury, and spinal subdural hematoma is the most frequent diagnosis. While spinal epidural hematomas are a rare occurrence, the incidence of spontaneous epidural hematomas occurring in nonaccidental head injury patients is even lower [5].

In 2019, relevant articles and registries were identified via systematic review; study quality was higher in the high-income countries (HICs) than in the low- and middle-income countries (LMICs). Sixty-nine million (95% CI 64-74 million) individuals worldwide are estimated to sustain a TBI each year. The proportion of TBIs resulting from road traffic accidents was greatest in Africa and Southeast Asia (both 56%) and lowest in North America (25%). The incidence of RTA was similar in Southeast Asia (1.5% of the population per year) and Europe (1.2%). The overall incidence of TBI per 100,000 people was greatest in North America (1299 cases, 95% CI 650-1947) and Europe (1012 cases, 95% CI 911-1113) and least in Africa (801 cases, 95% CI 732-871) and the Eastern Mediterranean (897 cases, 95% CI 771-1023). The LMICs experience nearly 3 times more cases of TBI proportionally than HICs.

Sixty-nine million (95% CI 64-74 million) individuals are estimated to suffer TBI from all causes each year, with the Southeast Asian and Western Pacific regions experiencing the greatest overall burden of disease. Head injury following road traffic collision is more common in LMICs, and the proportion of TBIs secondary to road traffic collision is likewise greatest in these countries. Meanwhile, the estimated incidence of TBI is highest in regions with higher-quality data, specifically in North America and Europe [6].

Epidemiology in Ethiopia

Traumatic brain injury (TBI) is a public health problem in Ethiopia. We need more knowledge about the epidemiology and neurosurgical management of TBI patients to identify possible focus areas for quality improvement and preventive efforts.

In a prospective cross-sectional study (2012-2016) at the four teaching hospitals in Addis Ababa, Ethiopia. All surgically treated TBI patients were included, and details on clinical presentation, injury types, and trauma causes were registered.

They included 1087 patients (mean age 29 years; 8.7% females; 17.1% < 18 years of age). Only 15.5% of TBIs were classified as severe (Glasgow Coma Scale (GCS) score 3-8). Depressed skull fracture (DSF; 44.9%) and epidural hematoma (EDH; 39%) were the most frequent injuries. Very few patients were polytraumatized (3.1%). Assault was the most common injury mechanism (69.9%) followed by road traffic accidents (RTA; 15.8%) and falls (8.1%). More than 80% of patients came from within 200 kms of the hospitals, but the median time to admission was 24 hours. Most assault victims (80.4%) were injured more than 50 kms from the hospitals, whereas 46% of RTA victims came from the urban area. Delayed admission was associated with higher GCS scores and non-severe TBI ($p < 0.01$).

The injury panorama delayed admission, and few operations for severe TBI are linked to a substantial patient selection both before and after hospital admission. The results also suggest that there should be a geographical framework for tailored guidelines, preventive efforts, and development of prehospital and hospital services [7].

Epidemiology in China

Sun et al. conducted a nationally representative door-to-door survey in the general population across all age groups in 31 provinces in mainland China in 2013.

All participants were reviewed for a history of physician-diagnosed TBI by trained investigators using a structured questionnaire. TBI survivors were considered as prevalent cases at the prevalent time. The present study also examined the odds of TBI as a function of sex, age, and other demographical variables using logistic regression model. + Of 583,870 participants, 2,673 individuals had suffered from a TBI during their past life, yielding a weighted prevalence of being 442.4 (95% CI 342.2-542.6) per 100,000 person. The TBI prevalence increased with increasing age. The present study observed the multiadjusted ORs of TBI were 1.9 (95% CI 1.8-2.1) for the male, 1.9 (95% CI 1.2-3.1) for the farmers, 1.9 (95% CI 1.2-3.3) for the retiree or homemakers, 3.4 (95% CI 1.5-7.7), and 2.8 (95% CI 1.1-6.6) for those whose education were primary school and high school, respectively. The most common external cause was road traffic accidents among those who were aged 18-34 years old and those whose educational levels were middle school in both genders.

The results indicate TBI was substantially prevalent among Chinese population and underscore the need to develop national strategies to improve the safe education on road and traffic of TBI in rural residents and some subgroup population [8].

Epidemiology in the United States

Every 15 seconds someone suffers a traumatic brain injury (TBI) in the United States. TBI causes more deaths in males <35 years old than all other diseases combined, and it is estimated that 2% of the U.S. population lives with TBI-associated disability. Despite extensive research and success in animal studies, successful drug therapies have proved elusive in clinical trials [9].

The Centers for Disease Control and Prevention (CDC) estimate that more than 1.7 million each year in USA sustain TBI. Of these, approximately 1.4 million are treated and released from emergency centers, 275,000 are hospitalized, 80,000 suffer long-term disability and 52,000 die [10] ,and another 235,000 are hospitalized for non-fatal TBI [11].

Incidence of TBI in all industrialized countries is comparable to the U.S., with estimates ranging from 150 to more than 300 per 100,000

Annual incidence of approximately 250-600 patients per 100,000, and mortality of 17 cases per 100,000.

It is one of the most common causes of death in ordinary accidents, natural disasters, or warfare.

These injuries frequently occur outside, leaving injured individuals exposed to environmental temperature extremes before they are transported to a hospital.

Each year, approximately 100,000 patients require neurosurgical evacuation of an intracranial hematoma in the United States [12].

There are strong and demographically stable associations between TBI and substance use. These associations may not only increase the odds of injury but impair the quality of post injury recovery [13].

Epidemiology in India

The exact incidence is unavailable in India.

From August 2012 to May 2013 at Department of Neurosurgery, S.C.B. Medical College, Cuttack, Odisha, India. All the pertinent details from case records of hundred and forty-seven children <15 years with TBI were analyzed. Follow-up was done for 6 months at outpatients department.

Age wise, incidence and severity of TBI is more common in 10-15 years. Males outnumber females with a male: female ratio 2.19:1. Overall, road traffic accident (RTA) is the commonest mode of injury. Assault is not uncommon (7.48% cases). Falls is common in <5 years while RTA is common in 5-15 years. The extradural hematoma was the most common injury pattern; however, surgical consideration was maximal for fracture skull. Overall mortality was 7.48%. Diffuse axonal injury has the maximum individual potential for mortality. We noticed excellent recovery in 68.7%, disabilities in 17.68%, and persistent vegetative state in 5.45% cases.

TBI in children carries good outcome, if resuscitated and referred early to a neurotrauma center, and managed subsequently on an individualized basis with a well-organized team approach. Severe TBI in children has a poor outcome [14].

Traumatic brain injury epidemiology in Europe

Traumatic brain injury epidemiology in Europe.

Traumatic brain injury in skiers

see Traumatic brain injury in skiers.

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