DENGUE IN CHILDREN OF NEPAL : A CALL FOR URGENT ACTION

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Dengue is the most common global arboviral disease caused by dengue virus (DENV), consisting of 4 serotypes (DENV 1-4) which are commonly transmitted by the bites of infected female *Aedes spp.* mosquitoes (*A. aegypti* and *A. albopictus*). The total greatest burden of dengue infections lies in tropical and subtropical regions with global estimate of 390 million dengue infections and 96 million symptomatic cases annually. Children are more prone to mosquito exposure as they spend majority of their time in schools and playgrounds.[1]

Dengue has become an endemic disease and an important public issue in Nepal affecting adults as well as children. The disease has been reported in tropical, subtropical and hilly areas of the country due to climate change, growing urbanization and poor vector control measures.[2] In endemic regions, environmental factors such as stagnant water (where mosquitoes lay their eggs), poor housing quality, lack of air conditioning, and environmental factors (temperature and humidity) increase the abundance, distribution, and risk of exposure to *Aedes aegypti*.[3]

The earliest cases of dengue were detected as early as 2004 in Nepal.[4] The sporadic cases continued and outbreaks occurred in 2006 and 2010. The disease is now endemic in Nepal and cases are reported in urban settings too. In 2024, dengue had spread to 76 districts, infecting 41,865 people and claiming 15 lives. The highest burden of the disease is in children, adolescents and young adults.[5] Children less than 15 years of age account to about 30-40% of the cases. Although all serotypes of DENV have been reported in Nepal, majority of the cases in children are infected with DENV2 and DENV3. The disease outbreak in Nepal is generally seen in the monsoon season (June-September) but cases have also been reported all around the year.[6,7] Infection with one dengue serotype induces life-long protection against symptomatic infection with that specific serotype (homotypic immunity) and induces only short-term cross-reactive protection from disease to the other serotypes (heterotypic immunity) for several months to years. Older children and adults with the second dengue infection are at the highest risk for severe disease due to antibody dependent enhancement (ADE).[8]

World health organization (WHO) has classified the disease into two categories (non-severe and severe dengue). Non severe dengue comprises of probable dengue, dengue without warning signs (previously called dengue fever) and dengue with warning signs (previously called dengue hemorrhagic fever). Severe dengue is also classified as dengue shock syndrome (DSS).[9,10] Dengue without warning signs or probable dengue can be diagnosed in people who are resident or had travel to an endemic area plus fever and two of the following criteria (nausea/vomiting; rash; headache, eye pain, muscle ache, or joint pain; leukopenia; positive tourniquet test and any warning sign). Dengue with warning signs include dengue infection in addition to any of the following- abdominal pain or tenderness; persistent vomiting; clinical fluid accumulation (ascites, pleural effusion); mucosal bleeding; lethargy or restlessness; hepatomegaly >2 cm and increase in hematocrit concurrent with rapid decrease in platelet count. Severe DENV infection includes infection with at least one of the following- i) severe plasma leakage leading to shock or fluid accumulation with respiratory distress; ii) severe bleeding; and iii) severe organ involvement (liver- aspartate transaminase or alanine transaminase ≥1000 units/L; central nervous system- impaired consciousness; organ failure-heart, others).[11]

Dengue infection in children occurs in 3 phases; febrile phase, critical phase and recovery phase. The critical phase is the most dangerous phase of the disease which can complicate and cause plasma leakage, bleeding and shock.

The diagnosis of dengue in Nepal faces a major clinical challenge. Limited health care facilities, lack of trainings of health care workers and unavailability of rapid diagnostic tests play important contributing factors for delay diagnosis. As the disease spectrum in children varies from asymptomatic infection to severe dengue, they need to be diagnosed at the earliest to protect them from dengue related deaths. DENV infection is diagnosed directly by detection of viral components in serum (RT PCR, NS1 antigen) or indirectly by serology (IgM ELISA).[12]

The management is generally supportive. Treatment measures in non-severe dengue include bed rest, anti-pyretics, and fluid therapy (avoid aspirin). Parents should be well trained to recognise the warning signs. Treatment in dengue with warning signs should be focussed to prevent dehydration and appropriate fluid therapy in different age groups preventing fluid over-load. Vigilant watching for any warning signs once the temperature declines 3-8 days after the symptoms began should be considered. Inotropes and blood component therapy should be considered in severe form of the disease. Unfortunately, these facilities are scarce in many low income countries which increase the morbidity and mortality.[10]

The health care set-ups in Nepal should be well equipped and trained to diagnose and treat dengue in a uniform way. Pediatricians, nursing staffs and laboratory personnel should be well trained to diagnose and treat dengue in children with a protocol based system. Prevention of dengue is by protecting the child from mosquito bites. Children should have proper clothing covering the arms and legs to prevent from mosquito bites. The government should adopt appropriate public health measures to prevent the spread of dengue by appropriate vector control. Supplying insecticide treated bed nets, fogging in high risk areas, eliminating the breeding sites of mosquitoes can drastically reduce the disease burden in the country. Sites where mosquitoes lay eggs should be eliminated by emptying and scrubbing, covering, or eliminating standing water receptacles around

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the house.[13] The disease surveillance programme like tracking dengue cases and regular reporting to epidemiology and disease control division (EDCD) should be strengthened. Educating parents and children also plays a pivotal role.

In conclusion, proper diagnosis, management and preventing dengue in children requires proper training to health care givers and providing the necessary logistics along with special focus in addressing the climate change of the country. Community based interventions, school awareness programmes, and parent education play an important role in addressing the disease.

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