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Review: Reye's Syndrome in Children: Symptoms, Causes, and Treatment

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ABSTRACT

Reye's syndrome is a serious condition that causes swelling of the liver and brain. It can occur at any age, but it usually affects children and teenagers after a viral infection, most commonly the flu or chickenpox. Reye's syndrome is rare. This condition is also known as Reye's syndrome. Symptoms such as confusion, seizures, and loss of consciousness require emergency treatment. Early diagnosis and treatment of Reye's syndrome can save a child's life. Aspirin has been linked to Reye's syndrome in children or teenagers with the flu or chickenpox. Do not give aspirin to children or teenagers. For fever or pain, consider giving your child acetaminophen (Tylenol, others) or ibuprofen (Advil, Motrin, others) for infants or children. Acetaminophen and ibuprofen for infants or children are safer alternatives to aspirin.

Keywords: Children, Reye's Syndrome, Symptoms, Treatment

1 Introduction

REYE'S syndrome is a rare but serious medical condition that primarily affects children and adolescents [1], often occurring after a viral infection such as influenza or chickenpox. This syndrome is characterized by a rapid progression of severe symptoms [2], including brain swelling and liver failure, which can lead to death without prompt intervention [3]. Although rare in modern times, understanding this syndrome, its causes, and treatment remains critical for healthcare professionals and parents [4]. Research continues to gain a deeper understanding of the pathogenesis of this syndrome, which may lead to the development of more effective targeted treatments in the future [5]. Until then, prevention and early diagnosis remain the cornerstones of protecting children and adolescents from the serious consequences of this rare condition. World Statistics on Reye's Syndrome United States Peak in 1980, 555 cases were reported in 1980, the highest number ever recorded in a single year [5]. Decrease in Cases After Aspirin Warnings, cases declined dramatically. Between 1987 and 1993, up to 36 cases were reported annually, with an average incidence of 0.03 to 0.06 cases per 100,000 children per year [6]. Since 1994, two or fewer cases have been reported annually. Mortality Rate.

France National Study, Between November 1995 and November 1996, a national study was conducted in France, including pediatric departments, and nine confirmed cases of Reye's syndrome were identified among children under 15 years of age, representing a rate of 0.79 cases per million children [7]. Eight of these children had been exposed to aspirin, West Germany Incidence, between 1983 and 1985, an incidence rate of 0.04 to 0.05 for every one hundred thousand below 18 years of old were recorded. Australia Incidence, Studies have indicated that Reye's syndrome [7] was as common in Australia as in the United States, although there was no clear association with aspirin use in some cases. Japan, Rare cases rare cases of Reye's syndrome have been reported, with some reports suggesting potential effects of other medications such as valproic acid [7]. Global Trends Global Decline in Cases: Since the 1980s, most countries have seen a significant decline in Reye's syndrome cases, due to warnings against aspirin use in children and public awareness (Figure 1) [8]. Current Cases, Reye's syndrome is currently considered very rare, with fewer than two cases reported annually in many developed countries [9].

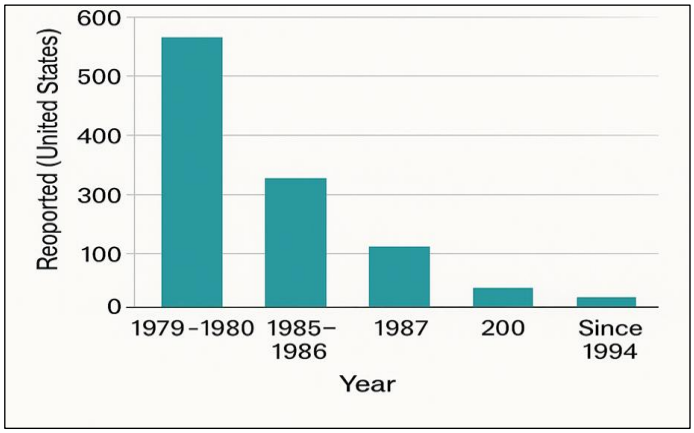

Fig. 1. Temporal trend in the decline of Reye's syndrome cases in the United States (1979–1994) [9].

The mortality rate was approximately 31% of cases reported between 1981 and 1997 [10]. United Kingdom Impact of Aspirin Warnings: The UK issued a warning from the usage of salicylic acid below 12 years. Subsequently, the incidence rate decreased from 0.63 cases per 100,000 children in 1983-1984 to 0.11 cases per 100,000 children in 1990-1991 (Figures 2 and 3) [11].

2 Reye's Syndrome Age and Distribution

Reye syndrome primarily affects children and adolescents, with the peak age of onset typically between 5 and 14 years old, and most commonly occurring around ages 6 to 12. While it is rare in infants under one year and in adults over 18, cases can occur across a wider age range [10].

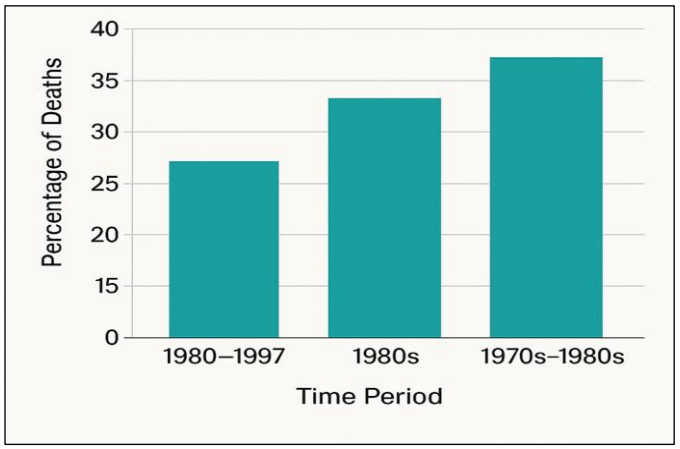

Fig. 2. Case fatality rates of Reye's syndrome across different time periods (11).

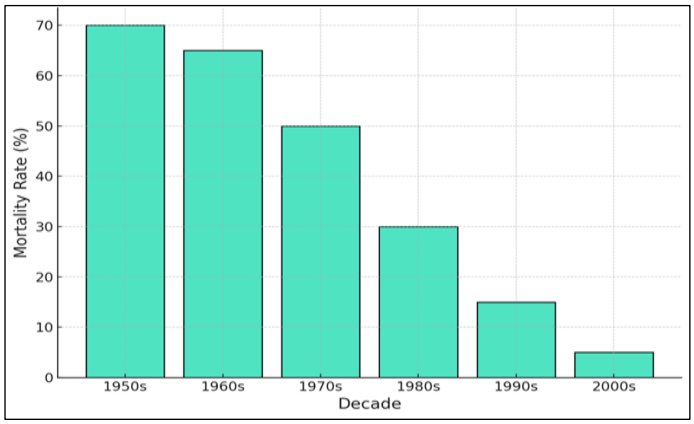

Fig. 3. Analysis of mortality rate reduction from the 1950s to the 2000s [10].

- Peak ages: The highest incidence is in children between 5 and 14 years old, with many cases occurring at age 6.
- Specific age groups:
  - School-aged children: Roughly 38% of cases in one report were found in ten to fourteen sample & 18% for 5-9 years old.
  - Younger children: Around 29% of cases were in the 0-4 age group.
  - Older children/young adults: 13% were in the 15-19 age group, and 2% were over 20.
  - Rarity: It is very rare in babies under one year old and in adults over 18.
- Seasonal variation: A seasonal pattern is often observed, with most cases reported between December and April, following viral illnesses like influenza or chickenpox (Figures 4 and 5) [11].

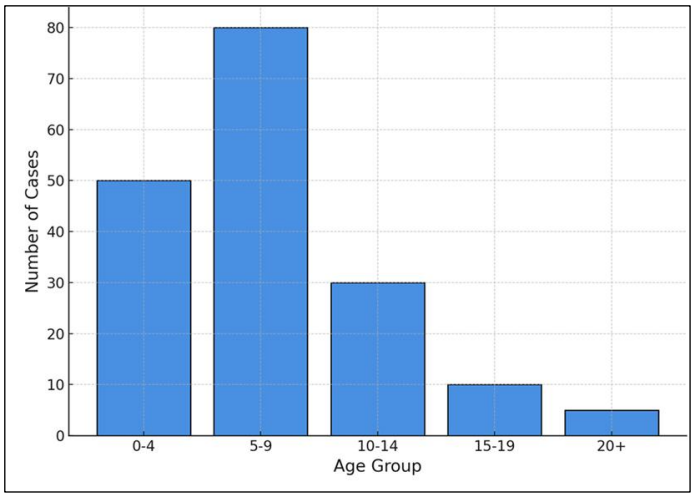

Fig. 4. Distribution by age group for Reyes syndrome [11].

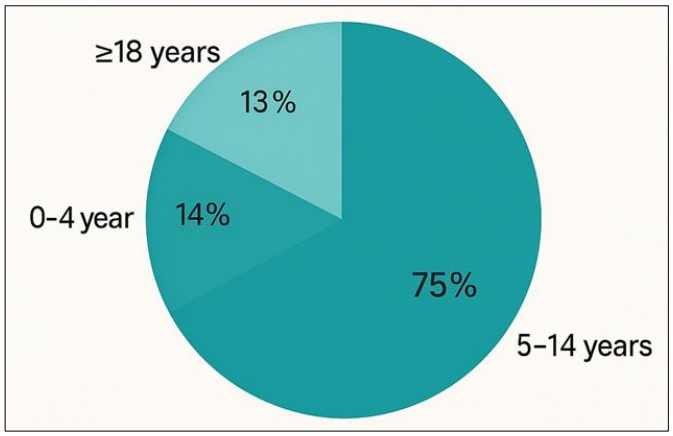

Fig. 5. Distribution by age group for Reyes syndrome [10].

3 Reye's Syndrome Causes

Reye's syndrome is a rare disorder that causes acute inflammation of the brain (encephalopathy) along with a sudden and rapid deterioration in liver function [4]. This syndrome was first identified in 1963 by the Australian physician Ralph Douglas Reye, hence its name [12]. The exact cause of Reye's syndrome is not fully understood [1]. However, it has been closely linked to the use of aspirin or products containing salicylic acid to treat fever or viral infections in children and adolescents. For this reason [13], international medical authorities advise against giving aspirin to children except under medical supervision [13]. Use of medications containing aspirin during recovery. Genetic predisposition in rare cases [14].

4 Clinical Symptoms and Signs

Symptoms of Reye's syndrome usually appear within a short period after a viral infection usually start about 3 to 5 days after a viral infection begins, and sometimes symptoms may begin to improve before suddenly worsening [1, 15]. The viral infection may be the flu, also known as influenza, or chickenpox [16]. Or Reye's syndrome may develop after an upper respiratory infection such as a cold [17]. Early stages include, Repeated vomiting without an apparent cause, Extreme sleepiness or lethargy [18]. Unusual irritability or aggression. As the disease progresses, more serious symptoms appear, such as, Mental confusion and delirium [19]. Seizures. Loss of consciousness. Difficulty breathing. Liver-related symptoms include [20] Elevated liver enzyme levels (ALT and AST). Low blood sugar (hypoglycemia) [21]. Increased intracranial pressure. Reye's syndrome requires emergency medical intervention, as brain swelling can lead to death within hours or days if the condition is not treated quickly and effectively [1] Blood sugar decrease for children with Reye syndrome in contrast to acidity and ammonia level in blood, also the level of fat will be increased in addition to hepatic swelling [22]. Brain also swelled that's lead to seizures, unconsciousness and convulsions [17]. Rapid breathing and diarrhea are the first symptoms for children less than 2 years, persist vomiting is the main symptoms for teenagers and older children, progressing of the disease lead to confusion aggressive, irritable and irrational behavior, in addition to fatigue in arms and legs to be un able to move which need emergency treatment especially with seizure and conscious less [23, 24].

5 Diagnosis and Tests

Early diagnosis of Reye's syndrome is challenging because the initial symptoms are similar to other more common conditions [25]. Doctors typically rely on a combination of laboratory and imaging tests to reach a diagnosis [26]. Diagnostic procedures include Blood tests to measure liver enzymes, glucose levels, and ammonia Blood gas analysis to measure acidity [27]. Computed tomography (CT) scan or magnetic resonance imaging (MRI) to detect brain swelling Liver biopsy (in some cases) to confirm the diagnosis and rule out other conditions [28]. It is important to rule out other conditions that may cause similar symptoms, such as meningitis, poisoning, or genetic metabolic disorders [29].

6 Prevention

Given the strong association between aspirin use and Reye's syndrome, prevention of this condition relies primarily on awareness [30, 31]. Prevention strategies include. Do not give aspirin or products containing salicylic acid to children and adolescents with a viral infection or fever, unless specifically recommended by a physician [32]. Use safer alternatives for fever, such as acetaminophen (paracetamol) or ibuprofen, continuously educate parents and healthcare providers about the risks associated with aspirin use [33]. Vaccines against chickenpox and influenza may also indirectly help reduce the incidence of Reye's syndrome by preventing the diseases that lead to its development [33].

7 Treatment and Management

There is no specific treatment for Reye's syndrome, but intensive medical care aims to support vital functions and minimize complications [1]. Treatment typically includes, Intensive care to monitor vital signs and respond quickly to any deterioration. Intubation and mechanical ventilation: These ensure you keep getting oxygen even when you can't breathe on your own. reducing intracranial pressure, using medications such as Manito or other methods to reduce brain swelling [34]. correcting metabolic disorders, by administering intravenous fluids containing glucose and electrolytes. Treating seizures, using anticonvulsant medications as needed [35]. liver support, in severe cases, interventions such as plasma transfusion may be required. In some serious cases where acute liver failure occurs, a liver transplant may be the only option for survival [36]. Safer alternative to aspirin must be utilized in fever or any pain related to flu and chickenpox like ibuprofen or acetaminophen except those with Kawasaki disease which need more time for treatment with Aspirin [37, 38].

8 Conclusion

Reye's syndrome is rare, fatal and sever medical challenge. Children and teenager are mainly affected following a viral illness, strongly linked to aspirin use during that time. While the exact cause is not fully understood, the risk is significantly reduced by avoiding aspirin in children and teenagers with viral illnesses, and instead using alternative pain relievers. Quick medical attention for suspected symptoms is critical, sever outcomes will be prevented if the disease early diagnosed but it is largely preventable through health awareness and the careful use of medications.

Conflict of Interest: The author declares no conflict of interest.
Financing: The study was performed without external funding.
Ethical consideration: The study was approved by Babylon University, Hillah, Iraq.

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