MedCrave
Step into the World of Research

Journal of Pediatrics & Neonatal Care

Editorial

Open Access

CrossMark

Is it now time to screen your baby for spinomuscular muscular atrophy?

Volume 12 Issue 2 - 2022

Dr. Mahaveer Singh Lakra,[1] Dr. Bhavana Lakhkar,[2] Dr.Kuldeep Singh Ahlawat M.D[3]

[1]Assistant Professor, Fellow in neonatal intensive care, Department of Neonatology, Jawaharlal Nehru Medical College, Datta Meghe Institute of Medical Sciences, India

[2]Professor and head, Department of Neonatology, Jawaharlal Nehru Medical College, Datta Meghe Institute of Medical Sciences, India

[3]Professor, World college of Medical Sciences, Research and Hospital, India

Correspondence: Dr. Mahaveer Singh Lakra, Assiatant professor, Fellow in neonatal intensive care, Department of Neonatology, Jawaharlal Nehru Medical College, Datta Meghe Institute Of Medical Sciences, Sawangi Meghe, Wardha, Maharashtra, India, 442004, Tel 9992693363, Email lakra.mahaveer@gmail.com

Received: April 28, 2022 | **Published:** April 29, 2022

Editorial

Spinomuscular atrophy is an illness that goes unnoticed and undiagnosed in most of the neonatal intensive care units, due to its unawareness and lack of proper treatment modalities. The diagnosis and management of spinomuscular atrophy (SMA) in neonates has always been a challenging task. Spinomuscular atrophy is a rare type of inherited neuromuscular disorder characterised by the degeneration of the alfa cells of the anterior horn of the spinal cord. The presentation and prognosis of disease vary depending upon the severity of the gene involved. It is a fatal condition for neonates with a poor outcome. It can have a varied clinical presentation apart from the usual course.[1] The treating doctors must be aware of the aetiology, progression, varied presentations, and treatment modalities of the disease.

Different types of spinomuscular atrophy have been defined in the literature. Type 1 is the most severe form and is seen in the neonatal period. Spino muscular atrophy type 1 is also known by the name Werdnig-Hoffmann Syndrome and is the most common type of muscular atrophy, seen in 80% of the overall cases.[2] The incidence of SMA is variable according to race and is found to be 8/100,000, 0.89 per 100,000, and 0.96 per 100,000 in white, black, and mixed ethnic populations, respectively. Werdnig-Hoffmann syndrome is a fatal autosomal recessive disorder with a disease incidence of 1 in 10,000 and a carrier incidence of 1 in 50.

SMA is a rare autosomal recessive progressive muscle disorder classified into four different phenotypes, of which type 1 is the most prevalent of the four types. Another variant, SMA type 0, has been defined by Dubowitz V. in the newborn period with more severe symptoms and the baby generally dies in utero. Type 1 is most commonly found in infants and manifests before the age of six months, characterised by global hypotonia, poor head control, and normal cognitive development. Type 1 has been further subdivided further into subtypes; type 1A is characterised by severe respiratory muscle involvement, sucking and swallowing difficulties, bulbar palsy, and sudden severe respiratory impairment, and it manifests between birth and 15 days. Type 1B usually begins before the age of three months, with inadequate head control, whereas type 1C begins between the ages of three and six months.[2]

Most of the time, babies with this disease present with muscle weakness, poor tone, absent areflexia, and bulbar palsy. The main presenting features in neonates are generally loss of muscle function, hypotonia, areflexia, respiratory failure, and feeding difficulty. Tongue fasciculations are the characteristic classical feature of SMA. Death usually occurs because of respiratory failure or aspiration pneumonia due to poor coordination and bulbar palsy. Various cases have been reported where babies presented with other unusual features apart from the hypotonia, severe muscle weakness and respiratory failure. Recently, a new entity called spinal muscular atrophy respiratory type one has also been defined, which mainly presents with distal muscle weakness, foot deformity, and severe respiratory distress.

There are mainly two gene pairs called "survival motor neuron gene" (SMN) types 1 and 2 that are involved in the disease's manifestation and are located on chromosome 5 at locus 5q11-q13. The SMN gene 1 causes the illness, while gene 2 is responsible for the severity.SMN1 and SMN2 are two very similar genes that play a key role, and two single nucleotide changes separate these genes, one in exon 7 and the other in exon 8.[3] Abnormal gene deletion leads to defective protein synthesis, causing progressive muscle weakness and global hypotonia.

The final confirmatory diagnosis is made by documenting the deletion of Exon by gene analysis, which generally shows the deletion of various copies of genes. Electromyography can be done but is generally not required when genetic studies are confirmatory. Various mutations have been defined in a study conducted in Ahmadabad, Gujarat by Sheth et al.[4] from January 2008 to August 2012, where 105 patients were studied. A definite diagnosis of SMA was found in 65 (62%) of the patients. Werdnig Hoffman illness was the most prevalent variety, with 34 (52.3%) of the children having it.

There are currently no promising treatments for SMA, but newer drugs are being developed, and gene therapy remains one of the most effective cures. There are no specific treatments available for SMA, but one new drug named, Nusinersen (Spinraza), which is being administered intrathecally, has been approved for use by the U.S. FDA.[5] The first oral drug named Evrysdi (risdiplam) has also been approved in 2020 for the babies more than two month having muscular atrophy. This is the first oral drug which is available and approved. Many countries have now started newborn screening for SMA as well, so that pre-symptomatic treatment can be started in neonates at least by the age of 1 year, which improves the outcome in proven cases.

The initiative was taken by the country of Germany, where a total of 165,525 kids were tested. There were 22 cases of SMA found, resulting in a 1:7524 incidence rate.[6] The efficacy of treatment is dependent on early diagnosis of the condition, as the objective must be to get a pre-symptomatic diagnosis so that therapy may begin before nerve cell damage occurs. Seeing the poor prognosis and severity of the disease, routine screening for spinomuscular atrophy can be done in developed countries where it is affordable, apart from routine neonatal screening. Because of the disease's severity and limited treatment options, it can be a part of routine neonatal screening.[7] The knowledge and varying presentations of this illness are important for the treating doctors from the prognostic point of view.

Most of the time, this disease goes unnoticed and undiagnosed as the manifestations are not clear and it is not picked up timely. The other reason is the lack of awareness not only in society but also among health professionals. This disease is neglected and has not received a diagnosis because of the limited modalities of treatment. We should raise awareness about spinomuscular atrophy among parents, doctors and gynaecologists. If a sibling or family member has a history of the disease, antenatal screening and carrier screening should be performed at birth. It should be included in routine newborn screening programmes in developing countries also. Depending on the nature and degree of the disease, spinal muscular atrophy can manifest in a variety of ways. It is not obligatory for a newborn with type 1 SMA to present with hypotonia and respiratory failure at birth; other symptoms may appear later. It is necessary to revise our newborn screening strategy, particularly in underdeveloped nations where it is not usually included. Early diagnosis may improve the baby's outcome, and it will help us in making appropriate referrals and arranging for more advanced medical interventions for the patients and the families.

Acknowledgments

None.

Conflicts of Interest

None.

References

1. Shababi M, Lorson CL, Rudnik–Schoneborn SS. Spinal muscular atrophy: a motor neuron disorder or a multi–organ disease? *J Anat.* 2014;224(1):15–28.
2. Audic F, Barnerias C. Spinal muscular atrophy (SMA) type I (Werdnig–Hoffmann disease). *Arch Pediatr.* 2020;27(7S):7S15–7S17.
3. Verhaart IEC, Robertson A, Wilson IJ, et al. Prevalence, incidence and carrier frequency of 5q–linked spinal muscular atrophy – a literature review. *Orphanet J Rare Dis.* 2017;12(1):124.
4. Sheth J, Patel H, Mehta S, et al. Clinical and molecular characterization of patients with gross hypotonia and impaired lower motor neuron function. *Indian Pediatr.* 2013;50(6):591–593.
5. Kariyawasam D, Carey KA, Jones KJ, et al. New and developing therapies in spinal muscular atrophy. *Paediatr Respir Rev.* 2018;S1526–0542(18):30048–30044.
6. Vill K, Kolbel H, Schwartz O, et al. One Year of Newborn Screening for SMA – Results of a German Pilot Project. *J Neuromuscul Dis.* 2019;6(4):503–515.
7. Prior TW. Spinal muscular atrophy: newborn and carrier screening. *Obstet Gynecol Clin North Am*. 2010;37(1):23–36.

Citation: Lakra DMS, Lakhkar DB, Ahlawat DKSMD. Is it now time to screen your baby for spinomuscular muscular atrophy? *J Pediatr Neonatal Care.* 2022;12(2):65–66. DOI: 10.15406/jpnc.2022.12.00457