

# Musicogenetics – A Tool in the Treatment of Leukemia

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**ABSTRACT**--Down syndrome or Tri 21 has been linked to leukemia and has been published as a case report in 1930. Ever since then, down syndrome has been documented as one of the main leukemia-predisposing syndromes. Reports from researchers, of profound Satellite associations seen in the chromosomes of Down syndrome patients clearly indicate increased DNA damage, signifying vulnerability to leukemia. Since 'Musicogenetics appears to be an emerging specialized field, as an innovation, Music therapy was given to nine children between the age group of eight months to one year to find out if the DNA damaging profile most predominantly seen in these children decreased, rendering them a hope that they may not be susceptible to leukemia. The frequency of satellite or acrocentric chromosomes in association of the babies was 81% before the music therapy [Veena music] and after three months of 24 music therapy hearings, it was found that the satellite associations fell to a startling 60% indicating that music could play a role in reducing the DNA damage. The mechanism is still unknown, but literature states that the soothing music stimulate calming alpha brain waves, helping to filter out stress, frustration, anxiety and agitation in Down's syndrome patients in general, helping them to achieve a sense of calmness which may have played a part in reducing the frequency of satellite or acrocentric chromosomes in association. Music therapy treatment at a very early age might provide Down's syndrome patients with a success-oriented, normal kind of experience, giving them a more optimistic self-image and a life without any gross medical complications in future. Also maybe the reduction of DNA damage due to music therapy may prevent the Down syndrome from the vulnerability to leukemia. More such studies are required before we arrive to a meaningful conclusion.

**Keywords**-- Musicogenetics – A Tool in the Treatment of Leukemia

## I. INTRODUCTION

Down syndrome or Tri 21 has been linked to leukemia and has been published as a case report in 1930. Ever since then, Down syndrome has been documented as one of the main leukemia-predisposing syndromes. Reports from researchers, of profound Satellite associations seen in the chromosomes of Down syndrome patients clearly indicate increased DNA damage, signifying vulnerability to leukemia. Thus, as an innovation, Music therapy was given to nine children between the age group of eight months to one year to find out if the DNA damaging profile most predominantly seen in these children decreased, rendering them a hope that they may not be susceptible to leukemia.

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## II. AIMS AND OBJECTIVES

To study the frequency of satellite or acrocentric associations in the chromosomes of Down syndrome babies before and after music therapy

To see if music therapy could reduce the DNA damage in Down syndrome babies.

To correlate the findings for a possible association of such therapy, as a treatment for the prevention of Down syndrome individuals from the vulnerability to leukemia.

## III. MATERIALS AND METHODS

Nine babies identified by Karyotyping with Down syndrome were referred to Music therapy department for treatment. Infants were allowed to listen to Veena music of Neelambari & Hamsadhvani raga for 30 minutes, twice a week for three months.

## IV. RESULTS

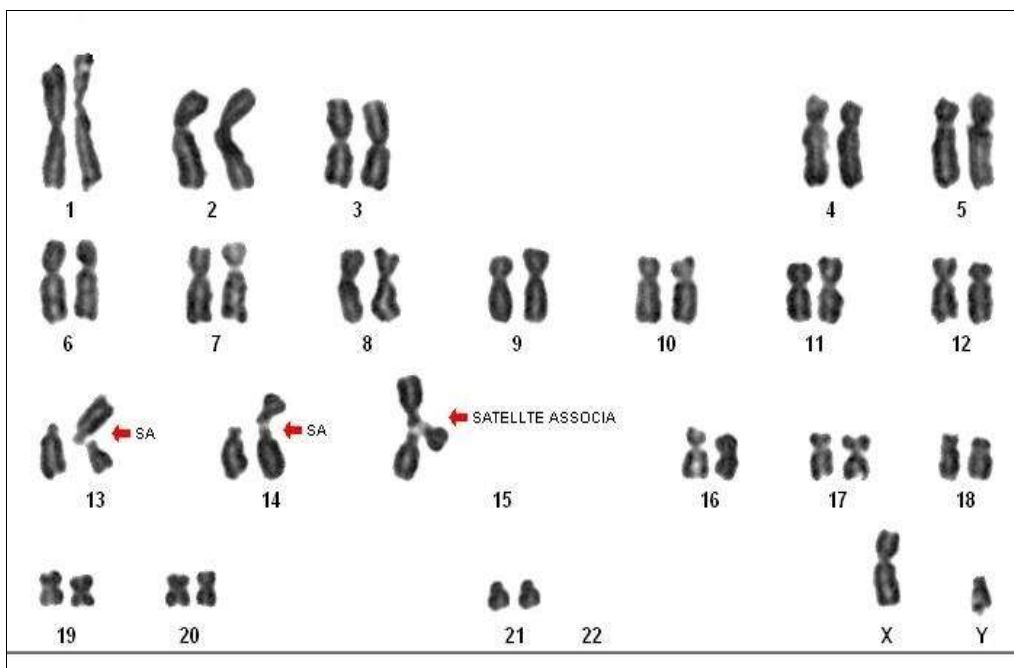
The frequency of satellite or acrocentric association in the chromosome of the nine babies was 81% before the music therapy [Veena music] and after three months of 24 music therapy hearings, the satellite or acrocentric chromosomes in associations fell down to 60%. (Fig.1. 2 & 3)



**Figure 1:** Metaphase of a normal Male



**Figure 2:** Metaphase of Male Down Syndrome with Satellite association



**Figure 3:** Karyotype of a male Down Syndrome with Satellite association

## V. DISCUSSION & CONCLUSION

The satellite regions of human acrocentric chromosomes 13, 14, 15, 21 & 22 are frequently located near one another in metaphase chromosome preparations. This relationship is called satellite association (SA) which as per literature is one of the few cytogenetic parameters that indicate DNA damage<sup>2</sup>. Identifying DNA abnormalities like satellite associations in syndromal cases may lead it to be a biomarker for cancer risk and may provide to a more effective prevention measures. Persons suffering from Down syndrome have been reported in literature that they have an increased risk for the progression of precancerous conditions such as myelodysplastic syndrome, and also potentially cancerous conditions such as transient myeloproliferative disorder (TMD) and cancerous conditions like leukemia. 10-20% babies born with Down syndrome are diagnosed with TMD. The reduction of satellite association from 80 % before music therapy to a startling 60% after the therapy indicates

that music seem to play a role in reducing the DNA damage. The mechanism is still unknown, yet it is a known fact that soothing music stimulate calming alpha brain waves, helping to filter out stress, frustration, anxiety and agitation in Down's syndrome patients in general, helping them to achieve a sense of calmness which may have played a vital role in reducing the frequency of satellite association<sup>4,5</sup>. One of the challenges faced in treating children with Down syndrome and precancerous & cancerous conditions like leukemia is balancing curative therapy against potential toxicities the intense medication taken by such individuals due to various ailments may have aggravated the already unstable chromosomes to a carcinogenic effect which also could be one of the factors for their vulnerability to leukemia.



**Figure 4:** A Down Syndrome baby listening to Music



**Figure 5:** The happy reaction of the baby while listening to music

Down's syndrome have been identified having a lower risk of many types of cancer, but still they are at a greater risk of developing leukaemia, especially in childhood. Many researchers have identified certain genes on chromosome 21 to be linked to leukaemia<sup>3</sup>. Such studies might shed light not only on the genes involved in leukaemia, but they could also facilitate doctors to identify Down's syndrome children who are at greatest risk of the disease. Once identified such children may take up music therapy at a full swing to get the benefit of minimizing their cancer susceptibility.

## **VI. CONCLUSION**

Music therapy treatment at an early infant age may provide Down syndrome individuals a success-oriented, normalized experience, giving them a more positive self-image and a life free from any kind of gross medical complications in future. Music therapy may be an alternative curative therapy which may play a role in the reduction of DNA damage thereby helping in the prevention the Down syndrome from the vulnerability to leukemia. More such studies are required before we arrive to a meaningful conclusion.

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