|| Print ISSN: 2589-7837 || Online ISSN: 2581-3935 ||
International Journal of Medical Science and Diagnosis Research (IJMSDR)
Available Online at www.ijmsdr.com
PubMed (National Library of Medicine ID: 101738825)
Volume 3, Issue 9; September: 2019; Page No. 15-18
Original Research Article
crossref DOI: https://dx.doi.org/10.32553/IJMSDR/v3i9.4

EARLY MORTALITY AND MORBIDITY PREDICTORS IN CHILDREN WITH DOWN'S SYNDROME

[1]Dr. Shahzad Mustufa, [2]Dr. Ammad Javaid Chaudhary, [3]Dr. Saad Javaid
[1]Post Graduate Resident, MD Pediatrics Medicine Unit 2 Mayo Hospital Lahore, Pakistan.
[2]MBBS; King Edward Medical University, Lahore, Pakistan.
[3]MBBS; Nishtar Medical University Multan, Pakistan
Conflicts of Interest: Nil
Corresponding author: Dr. Shahzad Mustufa

Abstract:
Objective: To examine the, early childhood morbidity and mortality in Down syndrome (DS) among children in the Pakistan.
Study design: The number of DS births registered by the hospitals department in 2018 to 2019 was compared with total live births (reference population) and perinatal registrations.
Results: 16 per 10,000 live births was the prevalence of DS. Compared with the reference population, the 182 children with trisomy 21 had a gestational age of 38 weeks versus 39.1 weeks (P < .001), a birth weight of 3119 g versus 3525 g in males (P < .001) and 2901 g versus 3389 g in females (P < .001), and mothers with a parity of >4.17% versus 5% (P < .001) and a mean age of 33.6 years versus 31 years (P < .001) and 33% (n = 54) >36 years). The mean age of DS diagnosis was 10.2 days in nonhospital deliveries and 1.8 days in hospital deliveries (P < .001). Children with DS were less often breast-fed (P < .05), and 86% (n = 156) were hospitalized after birth. Neonatal and infant mortality were higher in DS, 1.65% versus 0.36% (P < .02) and 4% versus 0.48% (P < 0.001), respectively.
Conclusions: DS is influenced by the mother's age. Early childhood DS mortality have declined

Introduction

Down syndrome (DS) is the most common cause of developmental delay and occurs in 12–14 per 10,000 live births in Sweden[1]. The syndrome is typically caused by trisomy of chromosome 21 and is related to the age of the mother with a rise in birth prevalence at maternal ages above 35 years. For this reason, all Swedish mothers over 35 years of age are offered prenatal screening (combined ultrasound and biochemical analysis [SBU, 2006] and/or prenatal diagnostic testing (amniotic sampling, chorionic villus sampling). Although the average maternal age has increased in Sweden, the prevalence of children born with DS remains constant due to prenatal diagnosis and early termination [1].

Termination of pregnancy can be performed for any reason before the end of 18weeks of gestation and is defrayed by the government. Of children born with DS, 40–50% have a congenital heart defect [2, 3]. The dramatic increase in survival seen in DS over the recent decades is mainly due to improved cardiac surgery. However, better overall knowledge of associated diseases has also contributed to improved health among individuals with DS. In Sweden children and adults with DS are followed regularly according to a specific medical care program [4], developed from the American and the Swedish guidelines.

The American Academy of Pediatrics recently published new guidelines for healthcare of subjects with Down syndrome up through 21 years of age [5]. Several earlier studies have reported on survival and causes of death in children and adults with DS. Some conditions, including congenital heart defects, childhood leukemia, and dementia, are much more frequent whereas atherosclerosis and solid tumors seem to be rarer compared to the general population [6-12].

The aim of the present study was to obtain data on birth prevalence, the duration and complications of pregnancy, any specific neonatal clinical symptoms that prompted the diagnosis, and the first-year mortality in children with DS.

Methodology

Pediatricians use to report various pediatric disorders, including DS at hospitals. Our study includes all live births in the period between June 1 2018 and June 30, 2019 who were diagnosed with DS and were reported to the hospital department. For each case reported during this period, a questionnaire was sent to the pediatrician in question. The completed forms were returned to the

Down Syndrome Study Group, where the data were analyzed. The anonymous questionnaire contained 26 questions relating to demographic and medical variables (e.g., aspects of the delivery, Apgar scores, birth weight, term figures, congenital defects, and feeding pattern).

The prevalence of DS among live births was calculated by the capture recapture method.The data were analyzed using SPSS and Student's t-test was used to determine statistical significance (P < .05).

Results

After corrections for double-counting, 220 children with a suspected diagnosis of DS were reported in 2018 to 2019. A total of 199 (90%) of the 220 questionnaires were returned, some incompletely filled out. Chromosomal analysis confirmed the diagnosis of DS in 193 cases, which were then used for further analyses. Six other cases were found to not be DS (Figure)

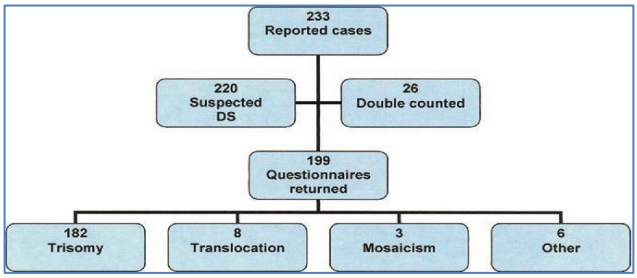

Figure 1:

The demographic characteristics of the 182 children with trisomy 21 were analyzed and compared with those of the reference population, which comprised all live births in the Pakistan in 2019 (n 200,297) (Table I). We restricted our analysis to the data on children with trisomy 21 because of the homogeneity of this group and of their mothers. The ethnic background of the DS population (n 166) reflected that of the reference population, with 80% from the indigenous population and 20% from ethnic minority groups. In terms of the proportions of children born at home and those born in a hospital, there was no significant difference between the group with DS and the reference population. In 149 cases (91%), DS was diagnosed in the first 7 days of life; of these, 129 cases (79%) were diagnosed on the day of birth itself. However, a diagnosis of DS was made at a much earlier stage in infants born in the hospital than in infants born at home (mean post gestational age at diagnosis, 1.8 days vs 10.2 days [P < .001]). In total, 156 (86%) children with DS were admitted to the hospital, generally a few days after birth. The mean age of the mothers of children with DS was 33.6, versus 31.6 years in the reference population (P < .001). Furthermore, 54 (33%) of the mothers of children with DS were age ≥36 years when the index child was born.

Table 1: Characteristics of trisomy 21 children and the reference population (total live births in 2003 in the Pakistan)

	Trisomy 21	**Reference population**	***P* value**
Birth number	182	200,297	
Gestational age, weeks (mean)	38	39.1	<.001
Birth weight, g (mean)			
Male	3119	3525	<.001
Female	2901	3389	<.001
Sex			
Male	54% (n 99)	51% (n 102,870)	
Female Place of birth	46% (n 83)	48% (n 97,427)	
Hospital	70% (n 126)	67.9% (n 136,202)	
Home	30% (n 53)	31.9% (n 64,095)	
Apgar score 6 after 5 minutes	98% (n 164)	99% (n 198,294)	
Parity (n 179)			
1	40% (n 71)	45.5% (n 91,120)	
2	33% (n 60)	37% (n 73,952)	
3	10% (n 18)	12.5% (n 25,299)	
4 or more	17% (n 30)	5% (n 9926)	<.001
Deliveries involving medical intervention	29% (n 52)	31% (n 62,092)	

We analyzed congenital heart defects (CHDs) in our population, because the severity and treatment of a CHD are very important factors in the outcome of DS. We found CHD in 87 of the 158 children with DS (55%). In terms of the time of DS diagnosis, there was no significant difference between children with a CHD and those without (mean post gestational age, 3.2 days and 2.2 days, respectively). Table II lists comorbidities (in addition to CHD) that were reported in the first few weeks of life. There was a significant difference in the incidence of breast-feeding from birth. Only 48% (n 83) of the mothers in the DS group breast-fed their child from birth, compared with 78% (n 156,232) of mothers in the reference population (P < .05). In 2019, neonatal mortality (ie, mortality in the first 27 days after birth) was 1.65% (n 3) in children with DS, versus 0.36% (n 725) in the reference population (P <.02).

In the same year, 13 children with DS died. Infant mortality in the reference population was 0.48% (n 96) (P < .001).

Table 2: Comorbidity of children with trisomy 21 (aside from CHD), n =176

Duodenal atresia	2% (n 4)
Hirschsprung disease	1% (n 2)
Congenital diaphragmatic hernia	1% (n 2)
Hypertrophic pyloric stenosis	1% (n 2)
Congenital cataract	1% (n 2)
Hydronephrosis	1% (n 2)
Transient myelodysplastic disease	0.5% (n 1)
Thrombocytopenia	0.5% (n 1)
Total	8% (n 16)

Discussion

Antenatal diagnostics and medical care for children with DS, along with their life expectancy, have improved substantially in recent decades. However, the full implications of these improvements, and of such issues as breastfeeding and hospitalization, are still not fully understood. The prevalence of DS in the Netherlands in 2003 (16 per 10,000 live births) was much higher than might have been expected based on previous registrations, and higher than suggested in the literature. Furthermore, the 2003 data for terminated pregnancies reveals a total prevalence of DS (both live births and still births) of 26.8 per 10,000 pregnancies. Eurocat registrations in the northern Netherlands between 1981 and 1990 show much lower DS prevalence of 10.6 per 10,000 live births and 12.8 per 10,000 pregnancies.

Worldwide, the overall prevalence of DS is 10 per 10,000 live births, which seems to have increased in recent years. To a large extent, however, the prevalence of DS depends on sociocultural variables. In countries in which abortion is illegal, such as Ireland and the United Arab Emirates (UAE), prevalence is higher, varying from 17 to 31 per 10,000 live births. Conversely, the prevalence in France is quite low (7.5 DS per 10,000), but this is probably due to a high percentage (77%) of DS pregnancy terminations. Increasing average maternal age at childbirth is a major reason for the elevated prevalence of DS.

In Europe, the proportion of mothers aged 36 and above has increased from 8% to 25% over the past 20 years12; we found a proportion of 33%. In some Middle Eastern countries (eg, UAE), 41.6% of mothers were age 36 or older when their child with DS was born. Despite the availability of advanced prenatal screening tests, the effect of maternal age on prevalence must exceed that of DS pregnancy terminations.

It should be noted, however, that these tests are not widely used in those countries in which specific policies and sociocultural attitudes against them prevail. Yet, even in the northern Netherlands, where these tests are available for women at increased risk of giving birth to a child with DS, fewer than half (43%) of all eligible pregnant women made use of them. Furthermore, such tests were not widely used even after they had become available for all pregnant women in the Netherlands, with usage rates of 4.7% in 1991 and in 6.4% in 1996.

In 1993, based mainly on increases in maternal age over time and in the use of prenatal testing, Cornel et al predicted that the prevalence of DS in the Netherlands would rise to approximately 17 per 10,000 live births. This figure is in agreement with our results. In the case of home deliveries, the diagnosis of DS was made a mean of 8.4 days later than in hospital deliveries. This is in agreement with findings previously published by others.13 It has been suggested that because the delivery of a child with DS is associated with increased risks, delivery should occur in a hospital.

However, based on Apgar scores in newborns, we found that the group with DS had no more risk factors than the reference population, and both groups had the same percentages of deliveries involving medical intervention. In addition, there was

no difference between these groups in terms of the point in time at which a diagnosis of DS was made in children with or without a CHD. Most children with a CHD are asymptomatic in the first weeks of life.

Our study found that DS as such was not the causal factor in neonatal death. The incidence of comorbidity with CHD was only 8% (n 16), and CHD is mostly asymptomatic immediately after birth. In fact, 16% (n 26) of these admissions were based purely on the suspicion of a diagnosis of DS, without a specific medical risk factor, and 8.6% (n 14) were related to maternal disease.

Conclusion

Children with DS now have a better life expectancy, which, coupled with the worldwide prevalence of DS (which is stable or even increasing slightly), means that the total population of DS individuals is expected to grow substantially.

References

1. Cocchi G, Gualdi S, Bower C, Halliday J, Jonsson B, Myrelid A, Mastroiacovo P, Amar E, Bakker MK, Correa A, Doray B, Melve KK, Koshnood B, Landau D, Mutchinick OM, Pierini A, Ritvanen A, Ruddock V, Scarano G, Sibbald B, Sipek A, Tenconi R, Tucker D, Anneren G. 2010. International trends of Down syndrome 1993–2004: Births in relation to maternal age and terminations of pregnancies. Birth Defects Res A Clin Mol Teratol 88:474–479
2. Frid C, Drott P, Lundell B, Rasmussen F, Anneren G. 1999. Mortality in Down's syndrome in relation to congenital malformations. J Intellect Disabil Res 43:234–241.
3. Irving CA, Chaudhari MP. 2011. Cardiovascular abnormalities in Down's syndrome: Spectrum, management and survival over 22 years. Arch Dis Child 97:326–330.
4. Pueschel SM, Anneren G, Durlach R, Flores J, Sustrova M, Verma IC. 1995. Guidelines for optimal medical care of persons with Down syndrome. International League of Societies for Persons with Mental Handicap (ILSMH). Acta Paediatr 84:823–827.
5. Bull MJ. 2011. Health supervision for children with Down syndrome. Pediatrics 128:393–406.
6. Baird PA, Sadovnick AD. 1987. Life expectancy in Down syndrome. J Pediatr 110:849–854.
7. Forssman H, Akesson HO. 1965. Mortality in patients with Down's syndrome. J Ment Defic Res 9:146–149.
8. Hermon C, Alberman E, Beral V, Swerdlow AJ. 2001. Mortality and cancer incidence in persons with Down's syndrome, their parents and siblings. Ann Hum Genet 65:167–176.
9. Yang Q, Rasmussen SA, Friedman JM. 2002. Mortality associated with Down's syndrome in the USA from 1983 to 1997: A population-based study. Lancet 359:1019–1025.
10. Hill DA, Gridley G, Cnattingius S, Mellemkjaer L, Linet M, Adami HO, Olsen JH, Nyren O, Fraumeni JF Jr. 2003. Mortality and cancer incidence among individuals with Down syndrome. Arch Intern Med 163:705–711.
11. Glasson EJ, Sullivan SG, Hussain R, Petterson BA, Montgomery PD, Bittles AH. 2002. The changing survival profile of people with Down's syndrome: Implications for genetic counselling. pp 390–393.
12. Coppus A, Evenhuis H, Verberne GJ, Visser F, van Gool P, Eikelenboom P, van Duijin C. 2006. Dementia and mortality in persons with Down's syndrome. J Intellect Disabil Res 50:768–777.