

Otolaryngological Issues in Down Syndrome Patients from Western Region of Saudi Arabia

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Abstract: Down syndrome (DS) is the most common chromosomal abnormality which results in extra genetic material from chromosome 21. Its incidence in Saudi Arabia is reported to be 1 in 554 live births. Otolaryngologic problems are common in children with DS. Early detection and intervention of such problems have led to decrease incidence of hearing loss, and better awareness of breathing disorders in DS patients. **Aims:** This work aims to enlist the common significant otolaryngological problems in Saudi DS patients attending the Genetic Clinic in King Abdulaziz University Hospital, in Jeddah, and focus lights on early intervention and management of such problems. **Methodology:** A prospective study included all patients attending the DS clinic of the department of genetic medicine at King Abdulaziz University Hospital (KAUH), Jeddah, between October 2007 and October 2011. Each patient underwent full history & physical evaluations, dysmorphic assessment and anthropometric measurements. Diagnosis was cytogenetically and/or clinically proven. All patients were subjected to ENT and hearing assessments. **Results:** A total of 130 patients (59% males and 41% females) with ages ranging between 0-33 years (mean = 5 ± 4.9) were included. Most of the patients 90.9% had trisomy 21 due to non-disjunction, 5.05% due to Robertsonian translocation and 4.04% had mosaic DS. ENT abnormalities were detected in 90/130 (69.3%) patients. External ear canal stenosis (40%), adenoid hypertrophy(33.3%) and tonsillar hypertrophy(32.2%) were the most common presenting anomalies, followed by otitis media with effusion(18%) and abnormal tympanogram(18%). Hearing loss were detected in (12.2%). **Conclusion:** This study showed that ENT anomalies are one of the most common problems associated with DS in Jeddah. All patients with DS should be evaluated for otolaryngologic anomalies with complete examination and investigations for further proper intervention.

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1.Introduction:

Down syndrome is a genetic disorder due to a numerical chromosomal abnormality which results in extra genetic material from chromosome 21. It is the most common and best known chromosomal disorder in humans. There are no known behavioral or environmental factors that cause Down syndrome. Its incidence in Saudi Arabia is reported to be 1 in 554 live births (Niazi et al, 1995)(1). Phenotypically, all DS patients have common dysmorphic features which include: upslanted palpebral fissures, depressed nasal bridges, low set ears, protruded tongues, single palmer creases and wide gaps between the first and second toes (Al-Shawaf & Al-Faleh, 2011)(2). More importantly, DS is associated with multiple congenital anomalies and disorders in various systems that may require early intervention. Individuals with Down syndrome have several morphologic abnormalities that predispose them to problems with the ear, nose and throat.

2.Aim:

This work aims to enlist the common significant otolaryngological problems in Saudi DS patients attending the Genetic Clinic in King Abdulaziz University Hospital, in Jeddah, and focus lights on early intervention and management of such problems.

3. Subjects & Methods:

The study was performed prospectively on 130 individuals with DS attending and following up at the DS clinic of the Genetic Medicine Unit at King Abdul-Aziz University Hospital (KAUH), Jeddah city, Kingdom of Saudi Arabia between October 2007 and October 2011. The recruitment protocol for the study was conducted in compliance with the Declaration of Helsinki and approved by (KAUH) Ethical Research Committee. Jeddah is the second largest city in Saudi Arabia and has populations of ~5.1 million (Abu Ras, 2011) (3). It is well known for its multi-cultural and multi-ethnicity society. The DS clinic at KAUH is the main referral center for DS

patients in Jeddah. Each patient underwent complete medical history taking and physical examination on the first visit. The medical history focused on: Antenatal, natal and postnatal history, pedigree analysis, parental age at delivery and developmental history. The physical examination included: Dysmorphologic assessment, and growth parameters which were plotted on DS specific charts. All patients were prospectively referred for complete ENT and hearing assessments and followed up on a regular basis. Chromosomal analysis was requested to confirm the clinical diagnosis of Down syndrome and the type for further genetic counseling of the family.

4. Results:

A total of 130 patients were examined and investigated in the 4-year period, either after delivery in our hospital or after referral from other facilities. There were 53 (40.8%) females and 77 (59.2%) males. Average maternal age at birth of the affected child was 35 years. Sixty percent of the mothers were aged 35 years or older. Among 99/130 cases of DS that had chromosomal studies performed, free trisomy 21 (non-disjunction) was present in 90/99 (90.9%) of cases, translocation was detected in 5/99 (5.05%) of patients and 4 patients (4.04%) were mosaic. Of the 130 DS patients included in this study, 90/130 (69.3%) patients had some form of otolaryngologic manifestations, and abnormalities. Figure.1 illustrates the distribution of ear, nose and throat disorders among the studied cases. The most common anomaly was external ear canal stenosis in 36/90 (40%) of patients, followed by adenoid hypertrophy in 30/90 (33.3%) of patients and tonsillar hypertrophy in 29/90 (32.2%) of patients. Otitis media with effusion (OME) was detected in 16/90 (18%) patients, as well as abnormal tympanogram (type B or C) in 16/90 (18%) of patients. Hearing loss (12.2%) either sensory neural in 4 patients and mixed in 7 patients were also reported.

5. Discussion:

The clinical diagnosis of DS usually presents with no particular difficulty. Karyotyping is essential for confirmation of the clinical diagnosis. The frequencies of the different karyotype patterns observed in this study when correlated with other studies was found to lie within the reported international figures. Jyothy et al, 2000 (4) from India, reported free trisomy in 86.6%, translocation in 7.7% and mosaicism in 5.8% of DS patients. Contrary to this, Mutton et al, 1996 (5) from England and Wales reported free trisomy in 95%, translocation in 4% and mosaicism in 1% of children with DS. Correspondingly, (Kava et al, 2004)(6)

from India found free trisomy in 95%, translocation in 3.2%, while 1.8% were mosaics. The discrepancy in the frequency of karyotyping in DS patients could be due to the maternal age and the population studied (Azman et al, 2007)(7). Sixty percent of the mothers were aged 35 years or older. This clearly indicates that maternal age was a major contributing risk factor in increasing the frequency of non-disjunction in the current study.

The prevalence of ENT problems in children with DS is high. The frequency of ENT problems in this study was 69.3%. The prevalence of ENT disorders detected by (Barr et al, 2011)(8) in preschool children with DS in Glasgow, UK was 91%.

Individuals with DS have clear anatomic differences in the head and neck region when compared to the general population. These anomalies include mid face hypoplasia with malformation of the Eustachian tube which increase the risk of recurrent ear infection as well as hearing loss (Bittles et al, 2007)(9).

External ear canal stenosis were detected in more than 40-50% of patients born with DS (Rodman&Pine,2012)(10). Otologic anomalies such as malformed ears and external ear canal stenosis were detected in 40% of the current studied cases. This frequency is lower than that reported in Malaysia (56.1%) by Azman et al, 2007(7). This represents a serious problem and makes visualization of the tympanic membrane for the diagnosis of ear infections or chronic ear fluids difficult. This abnormality also leads to accumulation of ear wax which plays a role in conductive deafness in DS patients. These children need to be monitored at least every 3 months until the ear canals have grown to ensure that no middle ear disease is present.

Roizen & Patterson 2003 (11) reported that shortened palate with relative macroglossia as well as narrowing of the oropharynx and nasopharynx which increases the frequency of obstructive air way complications and breath difficulties coincides with our findings in 9% of DS patients included in this study.

Recurrent acute as well as chronic otitis media with effusion are common among DS patients. OME was 93% at age of one year, falling to 68% by age of 5 years in the patients studied by Barr, et al, 2011(8). In the present study, the frequency of OME was (18%) in the studied age group. This needs tympanostomy tubes as an effective intervention tool to treat the DS patient and protect his hearing ability.

Disorders of breathing are extremely common in DS patients. Of the patients included in this study, 3.3% suffered from severe chronic rhinitis and sinusitis. Causes of airway obstruction in DS patients

include problems due to narrow nasal airway passages as well as low skull base and poor developed sinuses were reported by Lyons et al, 2012(12) and coincides with our findings. Maintenance of nasal hygiene is the target in DS patients to minimize the frequency of upper respiratory tract infection.

Macroglossia with low underlying tone of pharyngeal muscles were detected in 8.9% of patients included in this study and led to breathing difficulties. In a study done by Mitchell et al, 2003 (13) 26% of the DS patients suffered from upper air way obstruction secondary to macroglossia.

Laryngomalacia and tracheomalacia as well as tracheal stenosis are frequent problems in DS patients and can lead to respiratory distress in the infant with DS (Ramia et al, 2013)(14). In our study 5.5% of patients presented with laryngomalacia and/or tracheomalacia. Those patients need special medical consideration in the form of continuous observation and conservative management, as well as chest physiotherapy.

Symptomatic upper airway obstruction in the form of adenoid hypertrophy and tonsillar

hypertrophy were detected in (33.3%) and (32.2%) respectively of patients included in our study respectively. Obstructive symptoms were also common, with 79% of children having either currently symptomatic upper airway obstruction or a history of adenotonsillectomy by the age of 5 years (Barr et al, 2011)(8).

In our study hearing loss was detected in 12% of patients, 4.4% of patients had sensory neural hearing loss (SNHL) and 7.7% had mixed conductive and sensory neural hearing loss. The vast majority of DS patients have difficulties with conducting sounds. Literature review revealed that 4-20% of those may have either SNHL or mixed hearing loss (Hans et al, 2010)(15). SNHL may be due to inner ear or cochlea malfunction. It may be present since birth or develops later in life. It's serious effect is the loss of ability to understand spoken language. The high frequency tones which enhance speech are mostly involved (Hans et al, 2010)(15). Routine hearing testing is highly indicated as an intervention tool for such children.

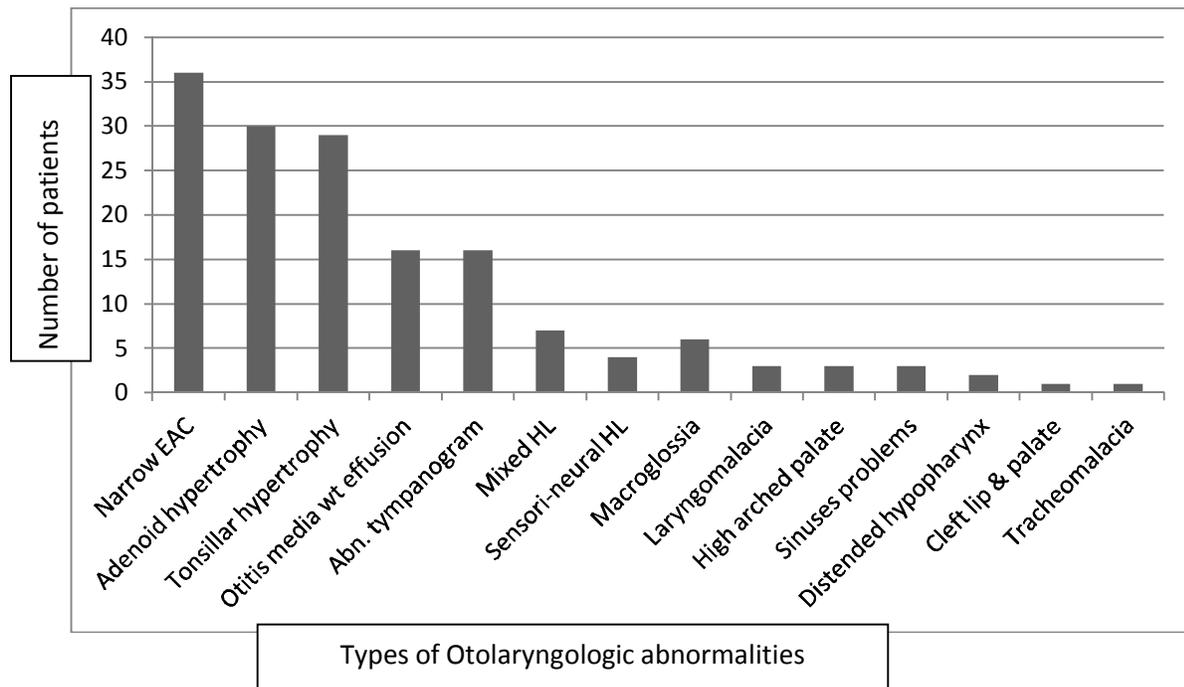


Figure 1.: Frequencies of Otolaryngologic Abnormalities found in DS patients

In conclusion

This study showed that ENT anomalies are among the most common problems associated with DS in a major referral center in Jeddah. Frequency and distribution of abnormalities differed from studies done in other populations. The cause of such difference may be due to other genetic influences. All patients with DS should be evaluated for otolaryngologic anomalies with complete examination and investigations for further proper intervention.

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We acknowledge this submission is not being considered elsewhere for publication. I assure that all the authors have participated in the present study report at various stages and approved the final version of this manuscript. On behalf of all authors I confirm that there is no conflict of interest. I accept the copy right of this article to the Life Science Journal. It would be an honor if it gets published in the respectable journal.

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1. Niazi, M. A., A. S. al-Mazyad, M. A. al-Husain, S. M. al-Mofada, F. A. al-Zamil, T. Y. Khashoggi and Y. A. al-Eissa. "Down's syndrome in Saudi Arabia: incidence and cytogenetics." *Hum Hered* 1995 ; 45(2): 65-69
2. Al-Shawaf R, Al-Faleh W. Craniofacial characteristics in Saudi Down's syndrome. *King Saud University Journal of Dental Sciences*. 2011; 2:17-22
3. Abu Ras, Promises new Jeddah. *Saudigazette.com.Sa* 2010-08-19. Retrived 2011-4-17.
4. Jyothy, A., K. S. Kumar, G. N. Rao, V. B. Rao, M. Swarna, B. U. Devi, M. Sujatha, C. K. Kumari and P. P. Reddy. "Cytogenetic studies of 1001 Down syndrome cases from Andhra Pradesh, India." *Indian J Med Res* 2000 ; 111: 133-137.
5. Mutton, D., E. Alberman and E. B. Hook. "Cytogenetic and epidemiological findings in Down syndrome, England and Wales 1989 to 1993. National Down Syndrome Cytogenetic Register and the Association of Clinical Cytogeneticists." *J Med Genet* 1996 ; 33(5): 387-394.
6. Kava, M. P., M. S. Tullu, M. N. Muranjan and K. M. Girisha. "Down syndrome: clinical profile from India." *Arch Med Res* 2004 ; 35(1): 31-35.
7. Azman, B. Z., R. Ankathil, I. Siti Mariam, M. A. Suhaida, M. Norhashimah, A. B. Tarmizi, M. A. Nor Atifah, T. P. Kannan and B. A. Zilfalil ().

- "Cytogenetic and clinical profile of Down syndrome in Northeast Malaysia." *Singapore Med J* 2007 ; 48(6): 550-554.
8. Barr E, Dungworth J, Hunter K, McFarlane M, Kubba H. The prevalence of ear, nose and throat disorders in preschool children with Down's syndrome in Glasgow. *Scott Med J* 2011 ; 56(2):98-103.
 9. Bittles AH, Bower C, Hussain R, Glasson EG). The four ages of Down syndrome. *Eur J Public Health* 2007 ; 17(2):221-225.
 10. Rodman R, Pin3e HS. The otolaryngologist's approach to the patient with Down syndrome. *Otolaryngol Clin North Am.* 2012 Jun;45(3):599-629.
 11. Roizen NJ, Patterson D. Down's syndrome. *Lancet*, 2003 ; 361:1281-9.
 12. Lyons M, Vlastarakos PV, Nikolopoulos TP. Congenital and acquired developmental problems of the upper airway in newborn infants. *Early Hum Dev.* 2012 ; 88(12):951-5.
 13. Mitchel R, Call E, Kelly J. Diagnosis and therapy for airway obstruction in children with Down syndrome. *Arch Otolaryngol Head and Neck Surg* 2003 ; 129:642-645.
 14. Ramia M, Musharrafieh U, Khaddage W, Sabri A. Revisiting Down syndrome from the ENT perspective: review of literature and recommendations. *Eur Arch Otorhinolaryngol.* 2013 May 21 . [Epub ahead of print]
 15. Hans PS, England R, Prowse S, Young E, Sheehan PZ. UK and Ireland experience of cochlear implants in children with Down syndrome. *Int J Pediatr Otorhinolaryngol.* 2010 Mar;74(3):260-4.

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