Health issues in persons with Down syndrome

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Introduction

The health of the learning disability (LD) population as a whole has, until recently, been of low priority. With the closure of large institutions virtually all persons with LD now live in the community, either in supported community units or with family carers. Persons with Down syndrome (DS), who are the most identifiable individuals with LD, are now regularly accessing all aspects of community health services. Virtually all dentists will, at some time in their career, treat a child or adult with DS. Optimum treatment will only be possible with some awareness of the wider physical and psychiatric problems with which a person with DS may present. This review will highlight some of the commonest forms of physical disorders seen in persons with DS (including obesity, cardiac conditions, ophthalmic and auditory conditions, endocrine dysfunction and musculoskeletal issues) and give a general over-view of associated psychiatric disorders (e.g. dementia, depression and obsessional behaviours). It is good clinical practice that all professionals coming into contact with persons with DS are aware of such health issues.

This review will not focus on the phenotypic characteristics of DS (physical or psychological) as these are often an inherent part of the syndrome and not an ‘illness’ as such. Only those problems with clinical implications for dentists will be considered. Readers are referred to several recently published books (Prasher and Smith, 2002; Pueschel and Pueschel, 1992) for more detailed information.

Obesity

Weight more than height is regarded as an indicator of health. A number of studies have confirmed the clinical experience that a significant number of persons with DS are overweight or obese (Melville et al., 2005; Prasher, 1995). Prasher (1995) found that 31% of males and 22% of females were overweight (BMI 25-29), with 48% males and 47% females obese (BMI >30). Overweight and obesity was significantly associated with living in the family home compared to supervised community units or in hospital. No association with the degree of LD was found. A number of medical complications are associated with being overweight and these can occur in persons with DS as well as in the general population. These include lung disease, arthritis (hands, knees, spine, hips), diabetes, cardiac pathology, hypertension, thyroid dysfunction and gastric disorders.

Why people with DS are susceptible to being overweight and obese remains unclear. However, several factors are important: excessive calorie intake, low metabolic rate thereby burning of less energy, less physical activity (associated with decreased muscle tone, delayed development, reduced physical activity), side-effects of medication and hormonal abnormalities (e.g. hypothyroidism). Heredity factors, emotional problems and the cultural setting are other important factors. Management of obesity, as for the general population, is primarily by dieting to reduce calorie intake and by regular exercise to increase calorie expenditure. Underlying causes such as hypothyroidism and side-effects of medication should initially be excluded.

Ophthalmic conditions

Ocular abnormalities are very common in people with DS (Table 1) and virtually all structures of the eye have been reported to have some associated abnormality. Some of the more specific abnormalities found in people with DS are considered below.

Refractive error disorders

Various disorders of refractive error are seen in persons with DS (Catalano, 1990). For those with mild refractive error, prevalence rates of myopia of 30-37% and of hypermetropia of 25-34% have been reported. Astigmatism can be seen in 20-29% of the DS population. Such figures are very much dependent on the age group investigated and the diagnostic procedures used. However, impaired
vision in both children and adults with DS can present as headaches, deterioration in day-to-day activities or deterioration in behaviour. The prescribing of spectacles or contact lenses is now standard, although fitting and getting the person to wear them can be difficult.

**Keratoconus**

Keratoconus is a disorder of the cornea of the eye and is a relatively recently identified association with DS, occurring in 15% to 30% of individuals (Lawless et al., 1989). Keratoconus may be unilateral or bilateral and may result in reduced visual acuity. In the advanced stage, scarring and opacification may lead to total blindness. Spectacles, contact lenses and corneal transplantation are the differing forms of treatment. Postoperative trauma and/or infection are the main cause as to why the graft fails after corneal transplantation.

**Cataracts**

Cataracts were first described in people with DS nearly one hundred years ago. The prevalence of cataracts in children is approximately 1.4% but can rise in adulthood to up to 93% (Haargaard and Fledelius, 2006; Hestnes et al., 1991). Bilateral cataracts are much more common than unilateral. Gradual deterioration in vision associated with a ‘cloudy lens’ is the typical presentation. However, surgical intervention is often not undertaken in half of the cases, but without surgical intervention blindness can result.

**Strabismus**

The prevalence of strabismus varies depending on age and definition but the majority of studies have reported a range of 19% to 69% (Jaeger, 1980; Yurdakul et al., 2006). Both esotropia (inward deviation of the eyes), which is the commonest form and exotropia (outward deviation of the eyes) can occur. Strabismus can usually be managed by correction of refractive error but occasionally may need surgical intervention. The aetiology is unknown but may be related to decreased visual resolution capacity or failure to develop an adequate accommodative convergence mechanism.

**Other disorders**

Nystagmus has been reported to occur in up to 30% of persons with DS and more frequently in those individuals who also have a strabismus. Fine rapid horizontal nystagmus is the commonest, followed by dissociated nystagmus, appearing pendular. Other, less common abnormalities of the eyes include increased number of retinal blood vessels crossing the disc margin, retinoblastoma, glaucoma, conjunctivitis and blepharitis.

**Audiological conditions**

Just as with ophthalmic problems, audiological problems are also common in persons with DS (Yeates, 1989). Prevalence rates for hearing loss have varied from 6.8-78.0%, depending on the age of assessment and measures used to detect hearing loss. Impairment can be conductive, sensorineural or mixed, the former being the most common type and usually due to impacted ceruman. Several researchers have demonstrated that DS individuals with impaired hearing have impaired social functioning (Lonigan et al., 1992) and significant hearing loss can lead to decline in educational and cognitive skills (Libb et al., 1985). Hearing aids, used to amplify the external sound, are fitted to improve the hearing, but for persons with DS expert advice and support is required to determine the most appropriate type of hearing aid and to ensure subsequent compliance, which can be poor.

**Endocrinological issues**

There are a number of important endocrine disorders that are associated with persons with DS (Table 2). Thyroid dysfunction and diabetes mellitus being the most common.

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<th>Table 1</th>
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<td><strong>Common ocular findings in persons with Down Syndrome</strong></td>
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<td>Epicanthus</td>
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<td>Upward slanting palpebral fissure</td>
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<td>Brushfield spots</td>
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<td>Ptosis</td>
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<td>Strabismus</td>
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<td>Cataract</td>
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<td>Keratoconus</td>
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<td>Myopia</td>
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<td>Hypermyopia</td>
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<td>Nystagmus</td>
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<td>Blepharitis</td>
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<td>Coloboma</td>
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<td>Nasolacrimal duct obstruction</td>
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<th>Table 2</th>
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<td><strong>Endocrinological abnormalities in persons with Down syndrome</strong></td>
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<td>Hypothyroidism</td>
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<td>Hyperthyroidism</td>
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<td>Diabetes mellitus</td>
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<td>Underdeveloped pituitary gland</td>
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<td>Abnormal response to growth hormone</td>
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<td>Abnormal levels of gonadotrophin hormones</td>
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Thyroid dysfunction
An association between thyroid disorders (TD) and DS is now well established (Prasher, 1999). The prevalence of TD is dependent on the geographical area and the population surveyed, but is reported to occur in approximately 4–6% of the general population. For the DS population, prevalence rates have been reported up to 66% (Prasher, 1999) with often an underlying autoimmunity. Hypothyroidism is commoner than hyperthyroidism. Recognition of TD (especially hypothyroidism), can be missed in individuals with DS; the patient is usually shorter in height than average and appears less active; has dry skin; excess weight, bradycardia and voice disturbance. These features are also frequently found in hypothyroidism and, therefore, make the early diagnosis of hypothyroidism in DS difficult.

Other investigations may suggest the presence of a thyroid disorder: an electrocardiogram with abnormalities consistent with hypothyroidism, routine examination for a goitre, detection of alopecia areata, early puberty in females by vaginal bleeding and minimal breast development and in boys by testicular and penile enlargement. Hereditary factors seem to play a part in the aetiology of TD in the DS population and several studies have shown significantly higher thyroid autoimmune disease in the parents or siblings of affected people.

Treatment for hypothyroidism is thyroxine replacement therapy. The dose is increased depending on response and blood levels. Life-long therapy is often required. For hyperthyroidism there is a need to reduce the thyroid gland activity by antithyroid drugs (carbimazole), surgery (thyroidectomy) or by giving radioactive iodine which reduces the function of the thyroid gland. Routine thyroid function monitoring is essential.

Diabetes mellitus
The prevalence of diabetes in persons with DS has not been established but is probably greater than in the general population. Diabetes mellitus leads to a chronic high glucose level in the blood due to insulin deficiency or resistance to the action of insulin. Diabetes in DS can be insulin dependent and non-insulin dependent, with the former usually affecting younger people. Characteristic symptoms include excessive urine output, thirst, weight change. Less common symptoms include skin infections, visual loss, confusion, loss of consciousness, behavioural problems. Hypoglycaemic attacks and diabetic ketoacidosis are life-threatening complications. Good diabetic control can be difficult in persons with impaired cognition, impulsive behaviours and in persons with limited social controls. Specialist support with more than average reviews by the local diabetic clinic is often required.

Cardiological aspects of health
Virtually all heart lesions in persons with DS become apparent at or soon after birth. Vida et al. (2005) found 54% of 349 neonates screened in their clinic had an associated congenital cardiac malformation. Approximately 20% had multiple defects. The commonest malformation was patent ductus arteriosus (29%), followed by ventricular septal defect (27%), atrial septal defect in 13% and atrioventricular septal defect in 9.5%. Cardiac malformations in children with DS should all be detected and treated if necessary during early childhood. However such problems can persist into adulthood or occur when a child with DS becomes an adult (e.g. mitral valve prolapse). Such cardiac abnormalities may be the main cause of death in up to 35% of children (Thase, 1982). The common cardiac defects are:

Ventricular septal defect (VSD)
This is a ‘hole’ in the muscle wall separating the two ventricles which leads to blood flow from the left ventricle to the right ventricle. This can lead to high blood pressure in the blood vessels to the lungs, resulting in a condition called ‘tetralogy of Fallot’ (see below). Small VSDs may close spontaneously and cause no problems. Larger defects or those that lead to symptoms will need surgical closure.

Atrial septal defect (ASD)
This is associated with blood flow from the left atrium to the right atrium. Individuals can be prone to chest infections, breathlessness, tiredness, palpitations and an abnormal heart beat. Small defects may close spontaneously or cause no significant problem but larger defects will need surgical intervention.

Patent ductus arteriosus
The ductus arteriosus is a blood vessel near the heart which normally closes within 48 hours of birth but if closure does not occur it remains open (‘patent’). If untreated, it can result in blood from the aorta flowing into the main artery of the lungs and leading to hypertension in the vessels of the lungs. If found to be causing problems, it will need surgical intervention.

Mitrval valve prolapse (MVP)
This is a malfunction of the mitral valve (the valve that controls blood flow from the left atrium to the left ventricle). Mitrval valve prolapse may be associated with an ASD and keratoconus. Usually heart lesions are detected by the presence of a heart murmur or when they lead to heart failure.

Tetralogy of Fallot
This is a group of heart lesions involving a VSD, narrow-
ing of blood vessel to the lungs, right ventricle enlargement and abnormalities of the aorta. This leads to mixing of blood within the heart. Common symptoms include tiredness, cyanosis, squatting after exercise and the presence of several heart murmurs. It can result in heart failure, polycythemia and early death.

**Endocarditis**

This is an infection within the heart, usually of the heart valves or at the site of a heart lesion. The commonest clinical symptoms and signs include a fever, night sweats, weight loss, weakness, changing murmur, skin lesions, microscopic signs of blood in urine, attacks of abdominal pain and heart failure. This may lead to clumps of bacteria being dislodged from the heart to other organs, such as lungs, which can be a fatal condition. This has been managed by treatment with antibiotics 1 hour before any dental procedure that is likely to lead to bacteria entering the bloodstream. However, recent evidence has questioned this practice given the lack of evidence. Many UK Trusts are now adopting the NICE guidelines in managing patients previously thought to be at risk of endocarditis (National Institute for Health and Clinical Excellence, 2008). Good dental hygiene is important.

**Eisenmenger complex**

This is a disorder affecting the heart and lungs together due to a long standing heart lesion (ASD, VSD or patent ductus arteriosus). The presence of a heart lesion can lead over time to damage to the blood vessels in the lungs. This can increase resistance to blood passing through the lungs which in turn leads to increased work put on the heart and results in heart problems. Frequent symptoms include cyanosis, breathlessness, tiredness, chest pain, swollen legs, fainting and headaches. Permanent heart failure and polycythemia are consequences. Treatment involves venesection to reduce the thickness of the blood and to reduce stress on the heart. A heart and lung transplantation may be required if the condition becomes severe.

**Respiratory issues**

Respiratory problems, especially respiratory infections and obstructive sleep apnoea, are recognised in people with DS. Structural abnormalities of the airways involving the nasal passages, and the oropharynx have been well described. Although the thoracic cage is usually of normal shape, there may be abnormalities of the twelfth rib. As with cardiac defects, abnormalities may be detected in childhood but may persist into adulthood. Post-operative respiratory complications may occur in children and adults.

**Gastrointestinal and urinary issues**

As with cardiac conditions, several gastrointestinal conditions can be congenital. These include imperforate anus, Hirschsprung disease, duodenal stenosis or atresia and tracheosophageal fistula or oesophageal atresia. They are a significant cause of infant mortality. As adults, persons with DS can be susceptible to H. pylori infection, hepatitis A and B infections (Wallace, 2007). Eating problems (such as food fads) or anorexia disorder are reported in children and younger adults with DS. Congenital genitourinary abnormalities associated with DS have been highlighted (Ariel et al., 1991). These include hydronephrosis, obstructive uropathy and renal agenesis. Such abnormalities may persist into adulthood where renal failure may occur.

**Musculoskeletal aspects**

Musculoskeletal disorders are known to increase with age in the general population. However, whether this also applies to the DS population remains unknown. Numerous muscular skeletal abnormalities have been reported in individuals with DS and two of the most significant involve the top of the cervical spine; atlanto-occipital instability (AOI) and atlantoaxial instability (AAI); instability of the joints due to laxity of the ligaments and joints. Cervical spine instability (AOI and AAI) is one of the most potentially serious orthopaedic conditions encountered in persons with DS. Over-extension or excessive mobilisation of the neck can result in spinal cord compression. Neurological symptoms may include brisk deep tendon reflexes, extensor plantar responses, ankle clonus, paralysis of the limbs, muscle weakness, gait abnormalities and difficulty walking. Surgical intervention to stabilise the cervical spine in symptomatic persons is recommended.

**Oral and dental health**

Persons with DS present with a number of anomalies in their cranial morphology and oral cavity (Table 3).

**Periodontitis**

Periodontitis is present in virtually all persons with DS at some time during their life. It is related to both age and level of oral hygiene (Cichon et al., 1998; López-Pérez et al., 2002). Toxins produced by plaque can result in bone loss around the tooth. Periodontitis generally follows on as a natural progression from untreated gingivitis. In the early stages, periodontitis can be superficially indistinguishable from gingivitis. Over a period of time the gingivae recede and as the root of the tooth is exposed, pain may be experienced when the tooth is stimulated me-
**Table 3.**

Cranial morphology and oral cavity abnormalities associated with Down syndrome

<table>
<thead>
<tr>
<th>Oral anomalies</th>
<th>Dental anomalies</th>
<th>Occlusion</th>
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<tbody>
<tr>
<td>Palate- reduction of the length, height and depth of the palate</td>
<td>Microdontia</td>
<td>Spacing</td>
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<tr>
<td>Lips, oral opening and covering mucosa- Hypotonia of muscles. tongue protrusion, drooling, chapped lower lip and angular cheilitis.</td>
<td>Hypodontia</td>
<td>Frequent malocclusions</td>
</tr>
<tr>
<td>Tongue - Scalloped or crenated, fissured, hypotonia</td>
<td>Tooth Agenesis</td>
<td>Frequent temporomandibular joint dysfunction</td>
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<tr>
<td>Macroglossia-relative appearance</td>
<td>Delayed eruption of primary dentition</td>
<td>Platybsia</td>
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<td></td>
<td>Delayed eruption of the permanent dentition</td>
<td>Bruxism</td>
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Mechanically (tooth brushing), chemically (sugary foods) or thermally (hot or cold food). Halitosis is a common feature of periodontal disease. As bone is progressively destroyed the tooth becomes noticeably loose within the socket. Eventually, so much of the supporting tissues are lost that chewing on the affected tooth/teeth becomes painful as the load exceeds their capacity to bear it. At this stage hard food will be avoided in preference for soft. A periodontal abscess may develop. Although periodontal disease can impact on quality of life leading to bleeding and attachment loss (Loureiro et al., 2007), the benefits of good health promotion were recently questioned (Zigmond et al., 2006). In contrast Cheng et al., (2008) reported improved healing in chronic periodontitis after non-surgical periodontal therapy, monthly dental visits with adjunctive chlorhexidine use.

**Dental caries**

A number of studies have reported that the prevalence of dental caries in persons with DS is less than that for the general population (Steinberg and Zimmerman, 1978). Caries of the root surface can be a problem in older people. As in the general population, plaque forms due to bacterial action on saliva and food particles. Sugar in food is fermented to produce acid that destroys enamel and over time, leads to dental caries. Sources of sugar both obvious and hidden include: sweets, honey, fizzy drinks, fruit juices, fruit cordials, biscuits, cakes, frosted cereals, canned fruit, baked beans, and salad cream. Treatment and preventive care involves avoiding sugary foods, especially as snacks or drinks between meals and just before going to bed. Brushing teeth with fluoride toothpaste makes the enamel more resistant to bacterial action. The early stages of dental caries may be helped by the application of a fluoride varnish. In extensive disease, restoration or even root canal treatment is indicated. Extraction of the tooth may be the only option if referral is delayed. Interventions such as these may need to be carried out under sedation or general anaesthesia.

**Psychiatric morbidity**

The diagnosis of a mental disorder in persons with LD is highly problematic because of the underlying cognitive impairments, poor communication, comorbid conditions (for example, sensory loss), poor test compliance and lack of standardisation of measuring instruments for people with LD. However, during the last two decades more robust diagnostic tests and criteria have been developed to enable better accuracy (Burt et al., 2005). Nevertheless, the diagnosis of a mental disorder is still influenced by the assessment process used (Mantry et al., 2008).

Overall, psychiatric disorders are more common in children and adults with DS than the general population, with a wide range of disorders reported (Table 4). For children, prevalence rates vary from 13-37% (Capone et al., 2006; Gath and Gumley, 1986; Menolascino, 1970). Disorders included behavioural reaction, psychotic reaction, adjustment reactions of childhood, psychoneurotic reactions, post-schizophrenic reactions, personality-trait disturbance and conduct disorders. For adults, prevalence rates range from 15-50%, with dementia and depression being of particular concern (Myers and Pueschel, 1991; Prasher, 1999). Although much is now known about mental disorders in the DS population, further research is still required to: more specifically define which conditions are associated with particular developmental periods, inves-


tigate the overlap of biopsychological and social factors and identify evidence based treatments (Dyken, 2007).

**Table 4**

<table>
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<th>Mental disorders associated with Down syndrome</th>
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<tr>
<td>Attention deficit hyperactivity disorder</td>
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<td>Conduct disorder</td>
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<td>Aggressive behaviour</td>
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<td>Obsessive-compulsive behaviour</td>
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<td>Stereotypic behaviour</td>
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<tr>
<td>Major depression</td>
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<tr>
<td>Dementia of Alzheimer’s disease</td>
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<td>Autism</td>
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**Hyperkinetic Disorder (Attention Deficit Hyperactivity Disorder, ADHD)**

Myers and Pueschel (1991) found ADHD to occur in 21 of their 497 DS sample with the majority (71.5%) occurring below the age of 20 years. The disorder, however, may be under-reported due to difficulty in distinguishing the disorder from a mental age related overactivity, conduct disorder or pervasive development disorder. Characteristic features include overactivity, fidgetiness, distractibility, impatience, inattentiveness, impulsivity, failure to complete activities. The inability to follow instructions and poor listening at school is common. Secondary unpopularity and behavioural problems are often reported. Behavioural therapy often with home, school and day-care involvement may reduce the effects of ADHD. Psycho-stimulant drugs which stimulate the mind (for example, Ritalin) can be used but under close medical supervision. However, often the behavioural problems persist.

**Conduct/oppositional behaviour disorder**

Conduct and oppositional behaviour disorders consist of a number of persistent behaviours such as destructiveness, stealing, fighting, firesetting, temper tantrums and uncooperativeness. Gath and Gumley (1986) and Myers and Pueschel (1991) confirmed the presence of these disorders in children with DS. These and subsequent studies dispelled the myth that all children with DS were ‘friendly and loveable’ and caused little distress to their parents. A small group of children with DS can be extremely difficult to care for. Their management is not too dissimilar to children from the general population where a strict regime and/or medication is required.

**Autism**

Interest in autism has grown considerably in recent times. However the accurate diagnosis of autism in persons with an already underlying LD is problematic. Over-diagnosis and under-diagnosis remain of concern (Hepburn et al., 2008; Pary and Hurley, 1992). Are behaviours part of the severity of LD? Are the behaviours part of the behavioural phenotype (personality) of children with DS? Are they due to a more serious illness such as schizophrenia? There remains a need for expert consensus on clinical guidelines.

Autism as originally defined includes significant problems in social interaction, communication and restricted repetitive behaviour, manifested at an early age (usually before 3 years), and not accountable for by the underlying LD. Myers and Pueschel (1991) reported that 3 (1.2%) of 261 children with DS had autism as compared to a prevalence of 0.02% reported in the general population. Behavioural therapy and carer support are the mainstay of management, with medication for some behaviours, for example propranolol for anxiety attacks or risperidone for rituals.

**Dementia of Alzheimer’s disease**

There is a strong clinical, pathological, and genetic association between DS and dementia of Alzheimer’s disease (DAD). The hallmark of DAD is the wide distribution and huge amounts of extracellular amyloid plaques and intraneuronal neurofibrillary tangles in the brain. Virtually 100% of all adults with DS by age 40 years have the characteristic neuropathological changes of AD in their brain. Findings would suggest that the clinical prevalence of DAD in adults with DS is 9% for the age range 40-49 years, 36% for age range 50-59 years and 55% for range 60-69 years (Prasher, 1995). The mean age of onset of DAD is approximately 50 years with a mean duration of 6 years but the onset can be as young as the early thirties.

Dementia begins with cognitive decline, most notably memory impairment, followed later by deterioration in social and self-help skills, loss of communication skills, development of psychiatric symptoms and personality change, mood changes, hallucinations, with neurological signs (especially development of primitive reflexes), seizures and physical dysfunction occurring in severe DAD.

Management by a specialist with knowledge of dementia in adults with LD is recommended. A familiar environment and a daily routine should continue as long as possible. Any underlying cause of an associated decline (for example, hypothyroidism, depressions), should be first treated. Recently, donepezil (Aricept), rivastigmine (Exelon) and galantamine (Reminyl) are drugs which have been licensed to treat DAD in the general population. These drugs enhance one of the chemicals (acetylcholine) in the brain. A benefit for people with DS who have dementia, and who have been treated with these drugs, has been reported although controversy remains about whether such drugs should be made available (NICE, 2005).
Depression

For the general population the prevalence of depression has been reported in the order of 2-10%, which is not too dissimilar for persons with DS (Khan et al., 2002). Symptoms and signs in persons with DS include: depressed mood, loss of interest, tiredness, weight loss or gain, disturbed sleep pattern, reduced activity or agitation, disturbed memory, diminished appetite and decline in social ability. Complications of self-harm or suicide are extremely uncommon. Management involves finding and treating any underlying factor for example, physical ill-health or recent emotional loss. The depressive illness can be treated with behavioural therapy, counselling, and/or a course of antidepressants (for example, amitriptyline, fluoxetine, lofepramine). Electro-convulsive therapy can be administered for severe cases. Clinical experience would suggest individuals do not fully recover to previous levels of abilities.

Obsessive compulsive disorder

The prevalence of OCD is reported to be 1.6-2.5% in the general population. Rituals and other repetitive behaviours in people with LD may be difficult to distinguish from compulsive behaviour and this must be borne in mind before a diagnosis of OCD is made. In particular, persons with DS as part of their personality often like routine and things placed in order. Prasher and Day (1995) reported OCD in 9 adults with DS. Four subjects had a disorder of excessive orderliness and tidiness, two of ripping paper, one of repeatedly washing herself, one of demanding to wear the same dress, and another of leaving from the front of the house and returning through the back door. None presented with hand washing or checking behaviour. It has been reported that a complication of OCD is ‘obsessional slowness’, where individuals can spend hours performing routine tasks such as eating, washing and dressing (Charlot, 2002).

Slowness can interfere significantly in day-to-day functioning and be extremely frustrating to carers. Behavioural therapy and/or antidepressants, especially clomipramine, fluoxetine, can be of benefit but the outcome is often poor (Sutor et al., 2006). Carer support to accept the behaviours remains an important part of the management plan.

Others

Children and adults with DS can suffer the same range of mental health problems as the general population. Anorexia and other eating disorders have been reported to occur. Phobias and post-traumatic stress are not uncommon. Alcohol abuse, self-harm and personality difficulties are rare but with greater community interaction may become more common.

Summary

This review highlights some of the clinical and practical aspects of ill-health affecting persons with DS. A general overview has been discussed but readers are encouraged to access more specific literature on particular matters. Oral and dental health may be directly affected by the general health of the person or the reverse can be true, where the quality of one’s well-being can be determined by good dental care. This is no more so than for individuals with LD. Increased awareness amongst all professionals, including dentists, is the first step to preventing many individuals with LD receiving inferior care. A better understanding of our patients can only help us to provide excellent care.

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