Realization of International Healthy Hearing Program in Poland – hearing evaluation in participants of Special Olympics

Starska K, Łukomski M*

Department of Otorhinolaryngology, Medical University of Łódź, Poland

Abstract

Purpose: International Healthy Hearing Program developed by International Special Olympics in Washington DC performs hearing screening during athletics competitions of athletes with mental retardation. The aim of this study was to introduce hearing screening performed according to Special Olympics Incorporated (SOI) Healthy Athletes Program.

Material and methods: The study was performed in Polish participans of Special Olympics during Summer National Special Olympics Game in Olsztyn in 2005 and Winter National Special Olympics Game in Białystok in 2004. HH evaluation was divided into 4 screening sequences: otoscopy, otoacoustic emission (DPOAE), tympanometry and pure-tone audiometry. During athletics competitions 208 Polish participants were examined.

Results: Of the total 208 athletes screened: 156 passed OAE (75%), 42 passed pure tone screening at 25 dB HL (20.2%), and 5 more passed the pure tone threshold test (2.4%). It means total of 203 passing hearing testing (97.6%). Hearing impairments were detected in 4.8% athletes and 2.4% of athletes needed hearing aids.

Conclusions: HH Program provided a more precise analysis of hearing in the group of athletes with mental retardation and a recognition of subjects who need audiological care.

Key words: mental retardation, Special Olympics athletes, Healthy Hearing Program.

* CORRESPONDING AUTHOR:
Department of Otorhinolaryngology, Medical University of Łódź
ul. Wandurskiego 3A/22, 93-218 Łódź, Poland
Tel: +48 42 6438154
e-mail: katarzyna.starska@op.pl (Katarzyna Starska)

Received 26.01.2006 Accepted 26.06.2006

Introduction

The mission of the Special Olympics Incorporated (SOI) Healthy Athletes Program, which is connected with the activity of International Special Olympics Committee, is to improve each athlete's ability to train and compete in Special Olympics Games. Officially launched in 1996, the Special Olympics Healthy Athletes Program regularly provides health services to Special Olympics athletes in two health specialties: dentistry and otometry. At the 1999 Special Olympics Healthy Athletes Program introduced health screening opportunities in hearing, nutrition, dermatology, physical therapy and orthopedics. The key objectives of the Healthy Athletes Program, under the auspices of Eunice Kennedy Shriver, Founder and Honorary Chairman and Timothy P. Shriver, Ph.D., President and CEO are: 1) to improve access and health care for athletes at event-based health clinics, 2) to train and educate health care professionals and students about the special needs of, how to communicate with, and care for, people with mental retardation, 3) to collect and analyze data and communicate about the health conditions and needs of people with mental retardation, 4) to raise public and professional awareness of the health care problems that Special Olympics athletes face.

The Healthy Hearing (HH) Program is a primary component of the Special Olympics Healthy Athletes Program and is designed for two purposes:

1. To study the prevalence of hearing loss in athletes competing in sport events,
2. To screen the hearing of athletes who participate in particular events, and notify them and their coaches and families if follow-up care is needed.

The most commonly cited definition of mental retardation comes from the American Association of Mental Retardation (AAMR). The AAMR has defined MR as the onset of significant limitations in both general intellectual and adaptive functioning during the developmental period (18 years and under). Intellectual limitation refers to an IQ which falls two standard deviations below the population mean (IQ<70) [1,2]. MR is

Table 1. **Results of test according to HH Program in screened group**

Examinations	Results					
OTOSCOPY	**208 athletes** → 114 (54,8%) external canal partially blocked by cerumen → 62 (29,8%) features of chronic eustachitis → 29 (14%) recurrent infections of upper respiratory tract					
DPOAE	+156 (75%)		-52 (25%)			
TYMPANOMETRY SCREEN			+31 (14.9%)		-21 (10.1%)	
PURE TONE SCREEN			+31 (14.9%)	-0	+11 (5.3%)	-10 (4.8%)
PURE TONE THRESHOLD TEST						+5 (2.4%) -5 (2.4%)
HEARING SCREEN	+203 (97.6%)					-5 (2.4%)

\+ Pass; - No pass
* 1) Otoscope Riester CE, Periscope; 2) Euro-Scan No 1824009 Widex, Maiko; 3) Maiko – Mi 24 Oticon; 4) Audio Screen Madsen Electronics

also defined by the American Psychiatric Association (APA) – Diagnostic and Statistical Manual of Mental Disorders (DSM--IV). The DSM-IV defined the degrees of MR: mild (IQ =50-55 to 70), moderate (IQ =34-40 to 50-55), severe (IQ =20-25 to 35-40) and profound (IQ <20-25) [3].

The aim of this study was to introduce hearing screening performed during Summer National Special Olympics Game in Olsztyn in 2005 and Winter National Special Olympics Game in Białystok in 2004 for Polish participants, according to Special Olympics Incorporated (SOI) Healthy Athletes Program.

Material and methods

The first two events in Poland which offered screening of hearing according to directives of Healthy Hearing Program (Herer & Montgomery, 2001) were performed with a group of 208 Polish athletes with mental retardation ages 18-44 during Summer National Special Olympics Game in Olsztyn in 2005 (130 participants) and Winter National Special Olympics Game in Białystok in 2004 (78 participants).

The HH Program contained four screening sequences: otoscopy, otoacoustic emission (DPOAE), tympanometry and pure-tone audiometry. Athletes were also conducted through two registration/check-out desks. First, before starting hearing screening, the purposes and techniques of screening were explained to each participant and coach or accompanying person. Using the report form, diseases of the upper respiratory tract and the most relevant information in the athletes' medical histories were gathered from coaches or accompanying persons. Next the laryngological examination of the pharynx, larynx, nose for elimination of the upper respiratory tract infections and developmental or anatomical anomalies were performed.

HH evaluation was divided into 4 screening sequences: otoscopy, otoacoustic emission (DPOAE), tympanometry and pure-tone audiometry. The pure tone threshold test was performed only in these cases in which every examination was failed. All examinations occured in the special testing area called "silence zone" which is, as a rule, a separate room near the gym or classroom. The following types of equipment were used for screening athletes:

1* –for otoscopy: PLEASE INSERT EQUIPMENT NAME AND NUMBER FOR EACH
2 – for otoacoustic emission DPOAE:
3 – for tympanometry:
4 – for pure-tone audiometry:

The first screening station (STATION 1 – otoscopy) examined ear canals and tympanic membranes tympanic for the presence of cerumen and signs of infections. Using the report form, volunteers circled if the external ear was clear or partially blocked. If something was unusual or ear canal is blocked the Clinical Director was alerted and decided about the athlete participating in the Special Olympics game. The second one (STATION 2 – otoacoustic emission DPOAE) screened hearing at 2000, 3000, 4000 and 5000 Hz using distortion product otoacoustic emission screener for objective estimation of inner ear (cochlear part of hearing organ). If an athlete passed the second station of the hearing screen, he proceeded to the check-out desk, turned in the screening report form and received a copy of the results. If an athlete did not pass the DPOAE he went to the third station (STATION 3 – tympamometry) and then the fourth station (STATION 4 – pure-tone audiometry). Tympanometry instrumentation objectively screens for middle ear conditions that may result in conductive hearing loss and thus may explain why the athlete did not pass the initial DPOAE hearing screen. The pure tone screen evaluated hearing acuity at 2000, 4000 Hz at 25 dB Hearing Level (HL) according to directives of Special Olympics Healthy Hearing Program after training tone of 50 dB HL. If a person indicated hearing each test tone, usually giving the behavioral response of raising a hand, then hearing thresholds were considered normal and that person should have no difficulty listening to the speech of others. The pure tone screen served to confirm the DPOAE screening outcome. The athlete completing the fourth screen then proceeded to the check-out desk, received a copy of the report form, which included follow-up medical or audiological recommendations as needed.

Results

In the examined Polish Special Olympics athletes, 177 of 208 participants (85.1%) had mild degree of mental retardation according to APA and 31 of 208 (14.9%) had moderate degree of MR.

The audiologic screening, performed according to directives of Healthy Hearing Program, in group of 208 athletes with MR disclosed (*Tab. 1*):

– 203 (97.6%) passed hearing screen,

– 114 (54.8%) athletes had ear canals partially blocked by cerumen,

– 62 of 208 (29.8%) had features of chronic eustachitis and 29 (14%) of them had recurrent infections of upper respiratory tract,

– 52 of 208 (25%) failed otoacoustic emission (DPOAE) screen and 156 athletes (75%) pass hearing screen,

– 21 of 52 (40.4%) of the athletes who failed DPOAE also tympanometry (21/208=10.1% overall),

– Among those 21 athletes – 11 (11/208=5.3%) passed pure tone screen at 25 dB HL,

– 10 of 52 (19.2%) had not passed pure tone screen at 25 dB HL (10/208=4.8%) and hearing loss concerned both ears. The 10 went on to receive pure tone threshold where 5 showed threshold losses (5/208=2.4%), and 5 passed their threshold hearing test. These athletes showed hearing loss/hearing aid needs,

– The 5 athletes who showed "hearing loss/hearing aid needs" were among those also failing tympanometry,

– Of the total 208 athletes screened: 156 passed OAE (75%), 42 passed pure tone screening at 25 dB HL (20.2%), and 5 more passed the pure tone threshold test (2.4%) for a total of 203 passing hearing testing – 97.6%.

Examination were performed by six trained and supervised volunteers (students of the Medical School).

Discussion

In an examined population of Special Olympics athletes diseases of middle ear and hearing disturbances occurred more often than in the general population. Athletes with mental retardation are particularly susceptible to otitis media or middle ear infections because they have developing immune systems which often show difficulty fighting infections, immature Eustachian tubes that prevent optimal fluid drainage, and may have enlarged adenoids that interfere with the Eustachian tube opening. Otitis media if it remains untreated can cause permanent hearing loss. Additionally, recurrent otitis media can have a negative impact on speech and language development, cognitive achievement and social and emotional development.

The prevalence of otitis media among people with mental retardation has not been adequately explored. There are some reasons to believe that persons with Down Syndrome are at increased risk of middle ear infections due to midfacial malformations and increased susceptibility to infections [5]. Dahle and McCollister [6] compared the prevalence of ear problems in persons with Down Syndrome to those with other forms of MR. They found that hearing impairment and infections were more prevalent among persons with Down Syndrome. Although not focused specifically on otitis media, the study of 293 residents of an English institution found that 40% of individuals with Down Syndrome and 29% of individuals with other MR had ear, nose and throat conditions [7]. Whiteman's research in group of person with MR confirmed that they are at risk for otitis media and middle ear infections [8].

Systematic audiologic examination in a population of athletes with MR is the first step in the process of identifying an athlete's hearing loss and preventing its negative effects from occurring in sporting and social events. Data gathered during European and World SO Games in period of 1999-2003 by Montgomery and Herer [9] disclosed that whereas less than 2% of adults ages 18-44 have hearing loss in USA, only 74% of the participants examined at Special Olympics Games showed positive results of hearing screen. Our study performed in Polish athletes during XI International Summer Special Olympics Games in Dublin in 2003 were similar (2.5% participants have hearing loss). Thus Healthy Hearing Program accomplished the mission of the Special Olympics Healthy Athletes Program of improving, through better health, each athlete's ability to train and compete in Special Olympics.

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