The Impact of Hearing Aid Use on the Nasalance Scores of Adults with Hearing Loss

Incidence de l'utilisation d'un appareil auditif sur les résultats de nasalance chez les adultes souffrant d'une perte de l'ouïe

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Abstract

The purpose of this investigation was to examine the impact of a hearing-aid on nasalance scores by evaluating nasalance in a prefitting condition and in a postfitting condition, and to determine in what way a more accurate auditory feedback system and possible other sensory information may play with regard to the nasalance scores. An additional objective was to compare the obtained nasalance scores of hearing-impaired participants in the prefitting and postfitting conditions with the nasalance scores of normal hearing participants. Furthermore, the effects of wearing a hearing aid on nasalance with respect to the severity of hearing loss and age were examined. The study group consisted of 19 adults with no known physical impairment other than a sensorineural hearing loss, which could interfere with speech production. None of the participants ever wore a hearing aid. The participants were asked to read three passages, each containing a different proportion of nasal consonants. The Nasometer 6200 was used to investigate the nasalance differences between the unaided and aided conditions. In part, the results of the present study indicate significant nasalance differences between the prefitting and postfitting conditions This suggests that velopharyngeal closure appears to be more accurate when auditory feedback is increased. Therefore, we can assume that the use of auditory feedback as a strategy to improve velopharyngeal function in patients with velopharyngeal disorders must be encouraged.

In contrast, the hearing-impaired participants do not show higher or lower nasalance values than normal hearing participants. In addition, nasalance, severity of hearing loss, and age were not positively related. Possible reasons for these findings are discussed.

Abrégé

Le but de la présente enquête consiste à déterminer l'incidence d'un appareil auditif sur les résultats de nasalance. Pour ce faire, nous avons évalué la nasalance avant l'ajustement d'un appareil auditif et après. Nous avons aussi tenté de déterminer de quelle manière un système d'auto-écoute plus exact et de l'information sensorielle pourraient influer sur les résultats de nasalance. Par ailleurs, nous avons comparé les scores de nasalance obtenus chez les personnes malentendantes avant d'ajuster leur appareil auditif et après avec les scores des participants dont l'audition est normale. En outre, nous avons examiné les effets de l'utilisation d'un appareil auditif sur la nasalance sur le plan de la gravité de la perte auditive et de l'âge. Le groupe d'étude est composé de 19 adultes n'ayant aucune déficience physique connue à part une hypoacousie neurosensorielle, qui peut nuire à la production de la parole. Aucun des participants n'avait porté d'appareil auditif auparavant. Nous leur avons demandé de lire trois passages, chacun contenant un nombre de consonnes nasales différent. Nous avons utilisé le Nasomètre 6200 pour vérifier les différences de nasalances entre l'utilisation ou non d'un appareil auditif. Les résultats de notre étude indiquent des différences de nasalance importantes avant l'ajustement et après. Cela sous-entend que

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l'occlusion vélopharyngée serait plus exacte quand l'auto-écoute est meilleure. Par conséquent, nous pouvons supposer qu'il faut encourager l'utilisation de l'auto-écoute comme stratégie d'amélioration de la fonction vélopharyngée chez les patients souffrant de troubles vélopharyngés. Par contre, les participants malentendants ne montrent pas des valeurs de nasalance supérieures ou inférieures à celles des participants dont l'audition est normale. Par ailleurs, nous n'avons relevé aucun effet de la nasalance, de la gravité de la perte de l'ouïe ni de l'âge. Notre article explique les raisons possibles justifiant nos conclusions.

Key words : nasometry, nasalance scores, hearing loss, auditory feedback, velopharyngeal closure

The speech of hearing-impaired and deaf speakers is often characterised by the presence of articulation, voice, and resonance abnormalities. The resonance disorders have been considered a consequence of the absence of acoustic regulation during voice and speech production and are not caused by the presence of a neuromuscular velopharyngeal dysfunction (Colton & Cooker, 1968; Fletcher & Daly, 1976; Ysunza & Vazquez, 1993). A number of authors have identified the resonance disorder as a cul-de-sac resonance (Boone, 1983; Higgins, Carney & Schuttle, 1994), hyponasality (Wilson, 1979), a nasality pattern comparable to that associated with cleft palate (Green, 1972), hypernasality (Svirsky, Jones, Osberger, & Miyamoto, 1998), and habitually nasalised (McClean, 1973). The information on these nasality disorders in hearing-impaired speakers was derived from perceptual assessment. Recently, reports from studies in which the use of objective instruments to evaluate nasalance in hearing-impaired participants have become available. Nasality is a major perceptual attribute of speech. It can be considered as a phonetic sign of the nasal consonants, as a vocal quality for speaker identification and as a primary or secondary symptom of many disorders and disabilities affecting speech transmission (Baken & Orlikoff, 2000; Fletcher, 1976). The term nasalance, on the contrary, reflects the relative proportion of sound emitted from the mouth and nose during speech (Baken & Orlikoff, 2000; Fletcher, 1976). Nasalance has been found to correlate with perceived nasality (Fletcher, 1976; Dalston, Warren & Dalston, 1991a, 1991 b; Dalston, Neiman & Gonzalez-Landa, 1993; Watterson, Lewis & Deutch, 1998).

Fletcher and Daly (1976) compared nasalance measurements obtained by Tonar II (predecessor of the Nasometer) for 50 speakers with severe hearing impairment and 64 speakers with normal hearing. The results of this study revealed a statistically significant difference between the nasalance scores of the hearing-impaired and those of the normal hearing participants. This same difference was also reported by Lapine, Stewart, and Tatchell (1991) who assessed 19 hearing-impaired children with the Nasometer 6200. Each hearing-impaired participant was asked to read or repeat the "Zoo Passage" (a passage without nasal consonants). Analysis of the trends for the mean nasalance scores in each speaking condition showed that the hearing-impaired speakers presented nasalance scores above the norm for the Nasometer. In addition to the degree of hearing loss, the age at testing or the use of amplification (hearing aids or FM systems), did not yield a significant difference in nasalance scores. The authors concluded that the motor patterns for velopharyngeal control were established sufficiently and the neuromuscular patterns needed for speech were adequately retained even without any supplemental amplification.

In a study of Tatchell, Stewart, and Lapine (1991), nasalance measurements using the Nasometer 6200 were obtained from 18 hearing-impaired children under three different speech conditions. The children were asked to read or repeat the Zoo Passage without amplification, with amplification and with FM amplification. Percent nasalance in each condition was compared according to the degree of hearing loss and the age of the participant. The results of this study indicated that mean nasalance scores for hearing impaired children did not significantly increase or decrease as a function of hearing loss, aided condition, and age. These authors suggest that the lack of differences between the device-on and device-off conditions can be explained by the constantly retained neuromuscular control of the velopharyngeal mechanism, even in circumstances when the auditory feedback loop had been compromised.

In another study by Lapine, Stewart, Settle, and Brandon (1992) nasalance scores were obtained from 37 hearing-impaired children. Nasalance scores were measured during the reading of the Zoo Passage with (device-on) and without (device-off) personal amplification. Significant differences for nasalance in the device-off and device-on conditions were not evident although a high, positive correlation between these conditions was reported. Also nasalance, age, and gender were not positively related.

These researchers (Fletcher & Daly, 1976; Lapine et al., 1991) investigated the differences in nasalance scores between hearing-impaired participants and normal hearing participants. They concluded that speakers with hearing loss do have greater nasalance scores in comparison with normal hearing speakers due to the absence of acoustic regulation during voice and speech production. Lapine et al. (1991, 1992) and Tatcell et al. (1991)

also investigated the nasalance differences in hearing impaired children in device-on-off experiments. From the reported studies it has become clear that nasalances scores of participants with hearing loss were not significantly different between the device-on and device-off condition, because of the retained neuromuscular control of the velopharyngeal mechanism during a short-term reduction of auditory feedback. Hearing seems to play a critical role in providing feedback about palatal function. Because participants are not able to "feel" the position of the velum during ongoing speech production, they must rely upon auditory feedback to achieve an oronasal resonance balance for normal speech production (Skolnick & Cohn, 1989). The importance of auditory feedback is well known. First, it plays a major role in different aspects of voice production (e.g. respiratory problems, loudness of voice, voice pitch and resonance) (Boone & McFarlane, 1994). Secondly, auditory feedback is being used as a therapeutic strategy in the treatment of velopharyngeal disorders.

The previously reported studies investigated the immediate impact (device-on and device-off conditions) of a hearing aid on nasalance scores, whereas literature shows no information on the short-term impact of a hearing aid on nasalance scores. Thus, the primary goals of the present study are to delineate: a) the impact of a hearing-aid on nasalance scores by evaluating nasalance in two conditions: prefitting condition (period before the actual fitting of the hearing aid) and the postfitting condition (after a three weeks constant use of a hearing aid), and b) to determine in what way more accurate auditory feedback, and possibly other sensory information, influences nasalance scores. Additional objectives of this study were to: a) compare the obtained nasalance scores of the hearing impaired participants in the preaided and aided conditions with the nasalance scores of normal hearing participants, and b) examine the effects of wearing a hearing aid on nasalance with respect to the severity of hearing loss and age.

Methods

Participants

Nineteen participants (13 men and 6 women) participated in this study. Participants ranged in age from 32;2 to 82;10 years with a mean age of 65;3 years (Figure 1). Patients were included if they had no history of craniofacial anomalies or velopharyngeal impairment and if there were no rhinological (suffering from common cold or nasal congestion), articulation, or voice disorders at the time of the study. Each participant was assessed by an otorhinolaryngologist performing a complete ear, nose and throat examination to exclude voice disorders, palatal, velopharyngeal and nasal pathologies. For the traditional nasopharyngeal and laryngeal examination the laryngologist used indirect laryngoscopy and macroscopic otoscopy. A Thudicum spring speculum was used for inspection of the nose. This ear,

Figure 1
Age and sex distribution of the study population

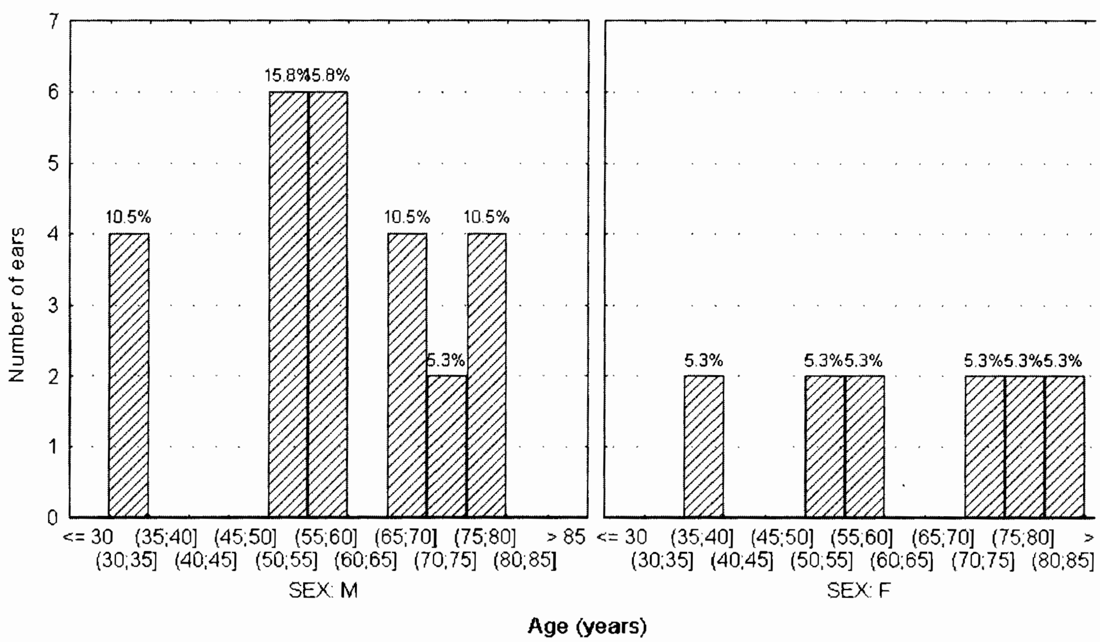
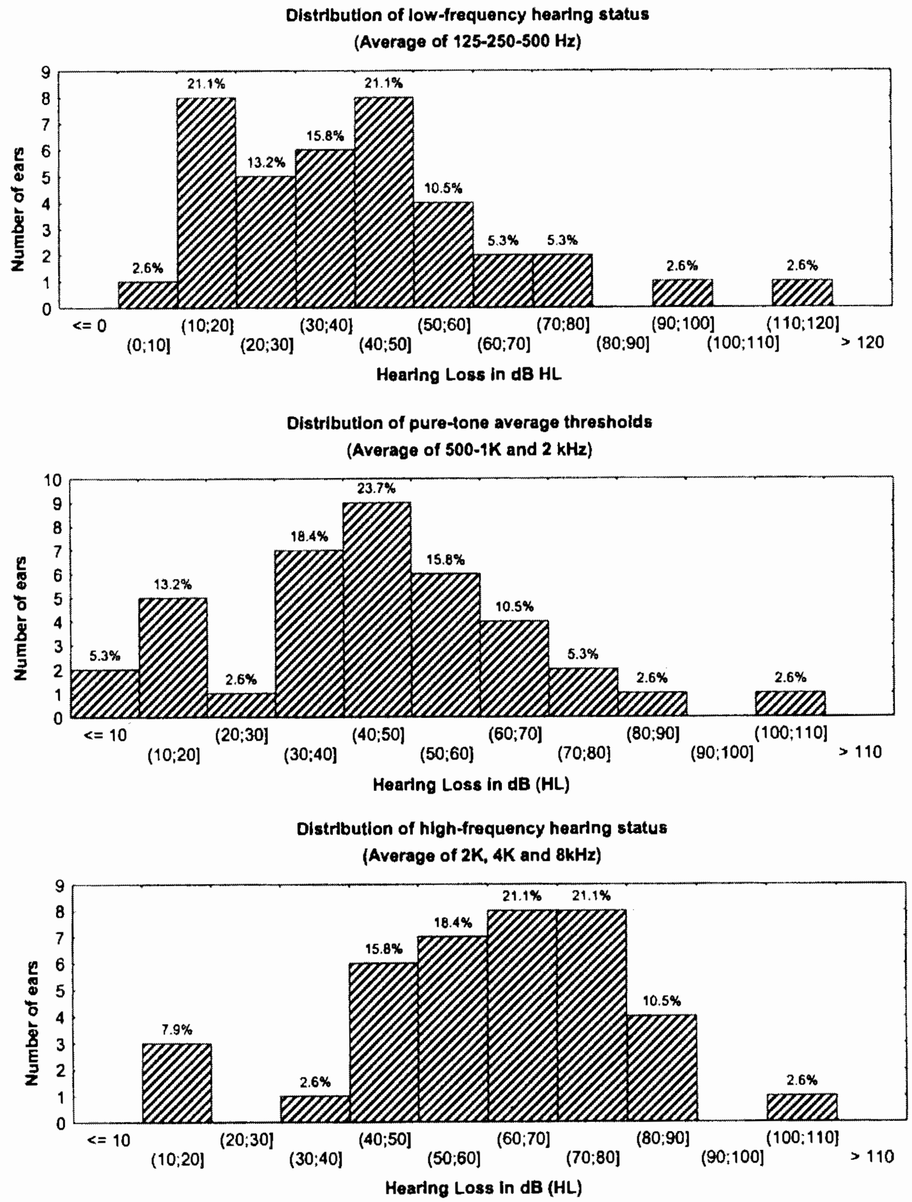


Figure 2
Distribution of hearing thresholds in dB (HL) in the study population at low, middle, and high frequencies. Each diagram shows the distribution for ears from the study group. The bars show the number of ears per 10-dB HL hearing loss.



nose and throat examination took place twice, once before the nasalance measurements in the preaided condition and once before the nasalance measurements in the aided condition. The articulation was assessed by two qualified speech-language pathologists (KVL, EH) from a five-minute sample of conversational speech. Audiometric data were obtained from 38 ears of the 19 participants included in this study. Audiometric data are described in terms of the conventional pure-tone average (PTA) (500, 1kHz, 2kHz), low frequency hearing loss (LOW) which is the mean of air conduction thresholds (AC) at 125, 250 and 500 Hz, and the average high frequency hearing loss (HIGH), the mean of AC thresholds at 4000 and 8000 Hz. These data are presented in Figure 2. In addition, audiometric data were described as a function of age (Figure 3).

All participants exhibited a sensorineural hearing loss with a pure-tone average loss (500 Hz, 1kHz, 2kHz)

Table 1

Mean nasalance scores in percentages (as provided by the Nasometer), Ses, SDs, and 95% prediction intervals (PI) of the three reading passages. The predication interval comprises 95% of the normal cases (Van Lierde et al., 2001).

Passage	Percentage of Nasal Consonants	Mean ± Se	SD	95% PI
Oronasal text	11.6% (29/251)	33.8±0.9	5.5	25.3-46.9
Oral text	0%	10.9±1.2	4.2	2.5-19.3
Nasal text	57% (86/152)	55.8±0.8	6.1	43.6-68

in the best ear of 34 dBHL (PTA) (range 0-55dB). Standard pure-tone threshold audiometry, via air and bone conduction, was carried out in a soundproof booth to explore hearing using a clinical audiometer (Interacoustics AC40, calibration: ISO389, 1975) at octave intervals from 125 to 8,000 Hz and with the modified Hughson-Westlake technique (Carhart & Jerger, 1959; Hughson & Westlake, 1944). None of the hearing-impaired participants had used a hearing aid before. The fitting of a hearing aid was done in the University Hospital by an experienced audiologist.

Instrumentation

The Nasometer (Model 6200) developed by Fletcher and Bishop (1973) and manufactured by Kay Elemetrics (1994) was used for data collection. The Nasometer is based on an earlier instrument called Tonar (The Oral Nasal Acoustic Ratio). The Nasometer is slightly different in structure, function, and practical features from its predecessors Tonar and Tonar II. The Nasometer is known as an indirect and objective assessment instrument. With this microcomputer-based device, the oral and nasal components of a participant's speech are sensed by microphones mounted on either side of an efficient sound separator plate, which rests on the participant's upper lip. The signal from each of the microphones is individually filtered and digitized by custom electronic modules. The resultant signal is a ratio of nasal to nasal-plus oral acoustic energy. This ratio is multiplied by 100 and expressed as a nasalance score (Kay Elemetrics,

Figure 3

Distribution of audiometric hearing thresholds, calculated by a low, mid, and high frequency average, as a function of age. Data presented at the bottom are not ranges of age groups, but individual age cases. For example, data presented for G3 (group 3): 39 gives the information for all patients having an age of 39 years.

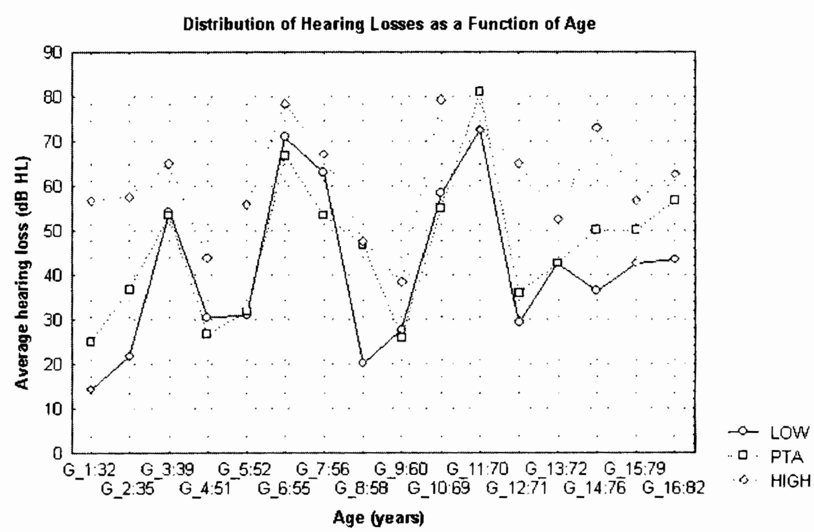


Figure 4

Comparison of nasalance scores in the preaided versus aided condition, as a function of age, obtained using an oronasal, oral, and nasal text. Text 1 is an oronasal text, Text 2 is an oral text, and Text 3 is a nasal text.

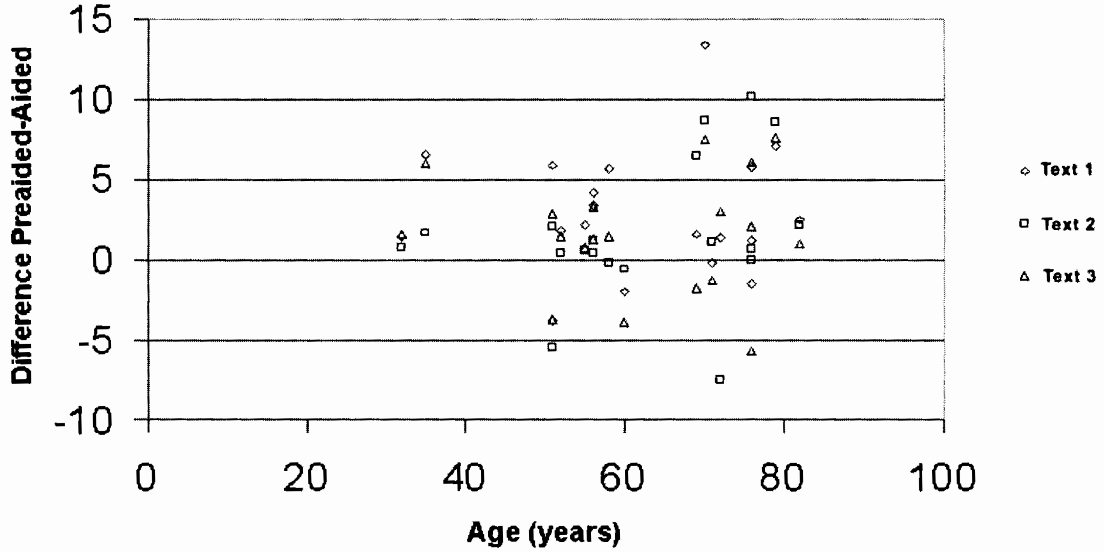


Table 2

Normative nasalance values, standard error and standard deviations of the three reading passages and the 95% prediction interval (PI) for the three reading passages (Van Lierde et al., 2001). Mean nasalance scores of the nasalance values in % in the preaided and aided condition, standard error and standard deviations. P is the level of significance in comparing the nasalance values of the preaided condition with the nasalance values of the aided condition and in comparing the normative nasalance values with the nasalance values of the preaided condition and aided condition.

Passage	Normative nasalance data (N = 33)		Nasalance scores in the preaided condition (N = 19)	Nasalance scores in the aided condition (N = 19)	Nasalance scores preaided versus nasalance scores aided condition	Nasalance scores preaided condition versus normative nasalance scores	Nasalance aided condition versus normative nasalance scores
	Mean±SE(SD)	95% PI	Mean±SE(SD)	Mean±SE(SD)	p	p	p
Oronasal text	33.8±0.9 (5.5)	22.8-44.8	35.5±1.5 (5.6)	31.7±1.3 (4.6)	0.008*	0.4	0.01*
Oral text	10.9±1.2 (4.2)	2.5-19.3	12.9±1.4 (5.4)	11.2±1.5 (5.2)	0.041*	0.08	0.2
Nasal text	55.8±0.8 (6.1)	43.6-68	56.8±1.7 (5.2)	54.2±1.5(5.1)	0.005*	0.2	0.05*

*indicates a statistically significant difference at a probability level of 95% (p = 0.05).

1994). The result of this computation may be displayed as a statistical table, time history display, or nasogram (which shows nasalance for time periods from two through 100 seconds) and a bar graph showing moment-to-moment nasalance peaks for feedback purposes. Prior to initiating data collection, the Nasometer was calibrated in a sound treated booth following the procedures outlined in the manual (Kay Elemetrics, 1994). The position of the Nasometer headset was adjusted in accordance to the manufacturer's specifications. The Nasometer was selected for this study because it corresponds highly with the criteria pointed out by Horii (1980) who stated that the ideal technique for the evaluation of the physical correlates of nasality is psychological and physically noninvasive, capable of assessing velopharyngeal function during speech while not disrupting articulatory, phonatory, or ventilatory processes. Moreover, the technique should have no limitations for sensory feedback of speech activity and the results should be easily interpretated and correlate with perceived nasality.

Stimulus Material

The Dutch stimuli designed and used by Van de Weijer and Slis (1991) in their normative study were chosen as reading stimuli because they were comparable to the type of English passage that are designed specifically for use with the Nasometer (see Table 1).

The first passage, an "oronasal text" corresponds exactly with the English "Rainbow Passage" (Fairbanks, 1960) containing the same percentage of nasal consonants found in standard Dutch speech (11,63%) (Van den Broecke, 1988). The second passage, an "oral text" is similar with the "Zoo Passage" (Fletcher, 1972) and is normally used to detect hypernasality in a participant's speech. The last passage, a "nasal text," is designed to detect hyponasality in a participant's speech. However, the use of the collected Dutch nasalance data as cut-off limits to assess clinical levels of abnormal nasality must be interpreted cautiously (Van Lierde, Wuyts, De Bodt, & Van Cauwenberge, 2001).

The participants were instructed to perform each reading task at a comfortable vocal pitch and loudness level. Each participant was asked to read the experimental stimuli in the prefitting, as well as postfitting conditions. If the participants made a reading error, they were asked to read the passage again. The specific passages used are presented in the Appendix.

Statistical analysis

Statistica for Windows (version 5.1) was used for the statistical analysis of the nasalance data. For the comparison of the nasalance data in the preaided and aided condition the Wilcoxon test was applied. A Kruskal-Wallis ANOVA was employed where the participant's ages were divided in three groups (group 1: 32-55 years, group 2: 56-70 years and group 3: 71-82 years) to investigate the contribution of age between the preaided and aided condition. The student t-test was applied for the comparison of the nasalance values in the preaided and aided condition with the normative nasalance values (Van Lierde et al., 2001). ANOVA was also employed to investigate the contribution of hearing loss (PTA data) to nasalance scores between the preaided and aided condition.

Results

Influence of Hearing Aid Use on Nasalance Scores

Group data on mean nasalance in the preaided and aided condition for each reading passage are presented in Table 2. In addition, the standard error and the standard deviation for the three reading passages are shown. The mean nasalance score for all hearing-impaired participants in the preaided condition for the oronasal text was 35.5%, for the oral text 12.9% and for the nasal text 56.8%. The mean nasalance score for all hearing-impaired participants in the aided condition after wearing the hearing aid for three weeks was 31.7% for the oronasal text, 11.2% for the oral text, and 54.2% for the nasal text. The Wilcoxon test showed statistically significant differences in nasalance between the preaided and aided conditions for the three reading passages (see Table 2).

Comparison of Nasalance Scores of Hearing Impaired Participants in the Preaided and Aided Conditions with Normative Nasalance Scores

Normative nasalance scores for each reading passage (Van Lierde et al., 2001) are also presented in Table 2. In addition, the standard error and the 95% prediction interval (mean ± 2s) for the three reading passages are provided. This interval comprises 95% of the normal cases. All the mean nasalance scores of the hearing-impaired participants in the preaided and aided condition were found within the 95% confidence interval. The student t-test showed a significant modification of the nasalance values between the oronasal text ($p = 0.01$) and the nasal text ($p = 0.05$) in the aided condition and the normative nasalance values of the oronasal and the nasal text.

Influence of Age on Nasalance Scores

Nasalance scores as a function of age were compared between the aided versus preaided condition in the oronasal, oral, and nasal texts (see Figure 4). This figure clearly shows a decrease in nasalance in the aided condition, however, there is no significant effect with respect to the age variable. The influence of age was evaluated through linear regression analysis by determining the coefficient of determination (R2). This value equals the proportion of variation in the age variable that can be explained by the variation of the nasalance scores. For the three reading passages this value was extremely low (< 10%), what indicates that in this small population, nasalance was not found to be related to age. Furthermore a Kruskal-Wallis ANOVA analysis was employed to investigate the contribution of age between the preaided and aided condition. Chi-square values did not show any significant ($p > 0.05$) relationship.

Influence of Severity of Hearing Loss on Nasalance Scores

The results of the one-way ANOVA indicated no significant effect ($p = 0.629$) for the impact of the degree of hearing loss on the nasalance scores between the preaided and aided condition.

Discussion

The present study investigated the impact of hearing aid use on nasalance scores by comparing a preaided condition with a condition of three weeks, during which a hearing aid was constantly worn. The short-term effects were observed during a three-week period, sufficient for demonstrating the emergence of short-term nasalance changes. However, this observation interval does not allow deducing nasalance changes over a longer period of time. All 19 participants were adults with no known physical impairment, other than a sensorineural hearing loss which could interfere with speech production. None of the participants wore a hearing aid previously.

Influence of Hearing Aid Use on Nasalance Scores

Significant nasalance differences were found between the preaided and aided condition. The obtained nasalance data yielded significantly lower nasalances scores in the aided condition for the three reading passages. Lower nasalance scores were obtained in the aided condition when the reading passages (oronasal and nasal passage) contained nasal consonants and obviously when a coordinate opening and closing function of the velopharyngeal mechanism was required. Lower nasalance scores were also obtained when the reading passage (oral passage) excluded nasal consonants and when the velopharyngeal mechanism was closed. The decreased nasalance values in the aided condition are hard to explain from the present study.

Hypothetically, the use of a personal hearing aid during a period of three weeks might contribute to the auditory monitoring of the nasalance output in a more accurate way and, thus, achieve the fine motor control of palatopharyngeal valving. This suggests that velopharyngeal closure is more accurate when auditory feedback, and possibly other sensory information, is increased. From this point of view we can assume that the use of auditory feedback as a strategy to improve velopharyngeal function in patients with velopharyngeal disorders must be encouraged. The results of this study are different from previous device-on and device-off experiments. In past experiments (Lapine et al., 1992, 1991; Tatchell et al., 1991) the nasalance scores of participants with hearing loss were not significantly different between device-on and device-off conditions. The adaptation period of nearly three weeks seems to be very important to demonstrate nasalance differences between an unaided and aided condition.

In the present study the mean nasalance scores for the three reading passages were not significantly higher in the hearing-impaired speakers in the preaided condition than in the normal group. The findings of this study support the physiological assessment of Higgins, Carney, and Schulte (1994), who investigated the velopharyngeal function in eleven hearing-impaired adults. They concluded that velopharyngeal control was not a significant problem for most individuals with hearing loss. However, the results of the present study are in contradiction with the findings of previous researchers (Fletcher & Daly, 1976; Lapine et al., 1991) who found nasalance scores above the norm. A comparison to the Fletcher and Daly (1976) study is difficult because the type of hearing impairment of the participants was not indicated. A possible explanation for the differences in the results of Lapine et al. (1991) might be due to the use of children with a sensorineural hearing loss as the study group.

In the present study the mean nasalance scores for three reading passages in the aided condition lies within the 95% prediction interval and can be regarded as normal. However, the mean nasalance scores for the oronasal and nasal text showed a significant modification in the hearing-impaired speakers in the aided condition compared to the normative nasalance values. This modification occurred when the reading passages included nasal consonants and when a coordinate opening and closing function of the velopharyngeal mechanism was required. Speech programming differences, in terms of differences in anticipatory nasal coarticulation may be influenced by more accurate auditory control. Further research regarding speech programming differences in the unaided and aided condition should be considered.

Influence of Age and Hearing Loss on Nasalance Scores

The mean nasalance scores for hearing-impaired adults did not significantly increase or decrease as a function of hearing loss or age. However in this study, there was no matching for age between the normal participants and the present experimental group. The present study did not show a relationship between nasalance and age in the hearing impaired speakers and this could be influenced by a lack of such matching. Hutchinson, Robinson, and Nerbonne (1978), Seaver, Dalston, Leeper, and Adams (1991) and Leeper, Rochet, and Mackay (1992) showed that nasalance scores increase with age, a finding that could not be confirmed in this study. This possibly may be explained by the limited number of participants included in the current study. Our results do, however, support findings of Lapine et al. (1992) and Tatchell et al. (1991) who found that nasalance, age, and severity of hearing loss were not positively related.

Until now there has been a lack of basic information on the short-term impact of hearing aid use on nasalance scores. The findings of the present study indicate that on the one hand significant nasalance differences were found in hearing-impaired adults when comparisons were made between a preaided condition and after three weeks of wearing a hearing aid. This suggests that velopharyngeal closure is more accurate when auditory feedback and possible other sensory information, is increased and proves the relevance of auditory feedback as a therapeutic strategy. There is evidence to conclude that the impact of a hearing aid influences nasalance and may influence overall speech intelligibility (which was not assessed in this study), especially in hearing-impaired participants who are not highly intelligible. On the other hand, the results of the present study indicate that hearing-impaired participants do not have higher or lower nasalance values than normal hearing participants. In addition, nasalance, severity of hearing loss and age were not found to be positively related. Future research should examine the occurrence of these effects in children and should determine if nasalance differences occur with hearing aid use for periods shorter than three weeks.

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Appendix

Reading Stimuli

Oronasal Text

Papa en Marloes staan op het station.
Ze wachten op de trein.
Eerst hebben ze een kaartje gekocht.
Er stond een hele lange rij, dus dat duurde wel even.
Nu wachten ze tot de trein eraan komt.
Het is al vijf over drie, dus het duurt nog vier minuten.
Er staan nog veel meer mensen te wachten.
Marloes kijkt naar links, in de verte ziet ze de trein al aankomen.

Oral Text

Het is zaterdag.
Els heeft vrij.
Ze loopt door de stad.
Het is prachtig weer, de lucht is blauw.
Op straat ziet ze Bart op de fiets.
Hij wacht voor het rode licht.
Als Bart haar ziet, zwaait hij.
Els loopt weer verder.
Bij de bakker koopt ze brood, bij de slager koopt ze vlees.
Als het vijf uur is, gaat ze terug, zodat ze op tijd weer thuis is.

Nasal Text

Vanmorgen ging meneer van Dam naar de groentenman.
Namelijk om een mand mandarijnen te kopen.
Aan zijn arm nam hij een mand mee om de mandarijnen in te doen.
Na een minuut of tien stond meneer van Dam in de winkel.
En hij nam een mand mandarijnen mee en ook maar meteen negen bananen en een mooie ananas.
Met zijn mand aan zijn arm ging hij toen snel naar huis.