# International Journal of Speech and Audiology
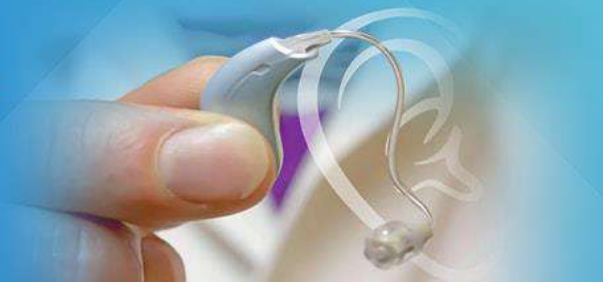
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# Comparison of Nasalence between Goan Konkani and Karwar Konkani Speakers

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## Abstract

**Introduction:** Nasalence is a measure of the degree of Velopharyngeal opening in voiced speech formed by computing the ratio of the amplitude of the acoustic energy at nares, to amplitude of the acoustic energy at the mouth. The present study attempted to find the nasalence value in two different dialects of Konkani language.

**Methods:** Thiry two subjects participated in the study and they were divided into two groups based on the dialects of Konkani language. The stimuli consisted of two sets of meaningful words and phrases of konkani language. Participants were instructed to read the list of words and phrases which were given to them The nasalence value of the participants were measured using Nasal view system version 4.

**Results and conclusion:** The results indicated that mean scores of nasalence were found to be more in Karwar dialect Konkani when compared to Goan dialect Konkani.

**Keywords:** Nasalance, Goan Konkani language, dialect, Karwar Konkani language

## Introduction

The velopharyngeal port is part of the filter systemthat acts as a valve to adjust the acoustic and aerodynamic coupling between the nasal cavity and the rest of the vocal tract [1]. It is necessary to open and close the velopharyngeal portduring the act of speech production and it depends on the specific speech sounds to be produced. For example, during the production of nasal sounds the passage way connecting the oro-pharynx with the naso-pharynx is closed. This is accomplished by lowering and raising, respectively, the soft palate, or velum. The term Nasalance has been proposed by Fletcher and his associates [2]. It is a measure of the degree of Velopharyngeal opening in voiced speech formed by computing the ratio of the amplitude of the acoustic energy at nares ($A_n$), to amplitude of the acoustic energy at the mouth ($A_O$). i.e. $A_n/A_o$. It can be expressed as a percentage, $A_n / (A_o + A_n)$, to yield a measure that can be referred to as "% Nasalance" (%N). Each measure contains the same information but with a different scale. There are various methods for instrumently monitoring velopharyngeal closure during speech production [3]. For instance, Accelerometer method, Nasometer, TONAR II and Nasalview are among the few. In the present study, the nasalence measures was found using Nasalview. Nasalview is a non-invasive method for assessing the nasality of speech by measuring the acoustic output from both the nasal and oral cavity. Two microphones, separated by an acoustic shield were used topick the signal.

There are several studies on developing the normative data in various languages. These studies attempted to investigate the nasalence scores of various languages and indicated that nasalance scores vary across languages [4-11]. In Indian context, the normative of nasalence in Tamil language was investigated [7]. Kay Nasometer (Model 6500) was used to analyze the data. They reported that, the normative of nasalence for oral stimuli and nasal stimuli were 9-15% and 58-62% respectively. They also reported higher nasalance value girls than boys.

Normative score of Nasalance in Kannada language was also reported in the literature [5]. The subjects were asked to repeat eight oral sentences and eight nasal sentences. The results revealed that in adults, significant difference was evident across gender. In males, for nasal sentences the nasalance value was 48.27% and for oral sentences 8.77%. In females, for nasal sentences the nasalance value was 58.22% and for oral sentences 14.69%. However, the differences in Nasalence score between genders were not statistically significant in both oral and nasal stimuli. The Nasometer II 6400 was used to for the data collection and analysis.

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Nasalence scores of normal Irish children with age range of 4 years to 13 years was reported [8]. Children repeated each of the 16 sentences individually. The sentences were presented in groups according to consonant type such as high pressure, low pressure and nasal consonant. Normative nasalance scores were obtained for three groups of sentences. The group mean nasalance score for boys was 26% (SD 4.18), and the group means nasalance score for girls was 27% (SD of 4.12). There was no significant difference in nasalance scores between genders.

There are many disorders that result in inappropriate oro-nasal valving. Some of them are cleft palate, hearing loss and many neurological disorders such as dysarthria. Usually in these disorders there is a failure to sufficiently close the oro-nasal passageway during non-nasal consonants or non-nasalized vowels. The normative nasalence is essential for the speech language pathologists to detect resonatory disorders.

### Need for the study
Konkani is said to be a nasal language. In Konkani, nasality can spread from a nasal consonant or vowel through assimilation across more than one syllable. Till date no studies attempted to estimate the nasalence score in Konkani language. Hence there is a need to find out the nasalence in Konkani language. There are various dialects in Konkani language and the spread of nasality can vary from one dialect to other [12]. Hence it is essential to obtain the normative nasalence scores with respect to dialects. This helps the speech language pathologists to identify resonatory disorders such as hypernasality, hyponasality and denasality in Konkani speaking individualsin various geographical locations. The present study attempted to find the nasalence value in two different dialects of Konkani language.

### Aim
- The present study aimed to investigate the nasalence scores in two different dialects of Konkani Language i.e. Goan Dialect and Karwar Dialect.
- To compare the nasalence value between Goan dialect and Karwar dialect of Konkani Language.

### Method
The study was carried out in four different phases.

### Phase I: Stimuli Preparation
Two sets of meaningful words and phrases were prepared in Konkani language. The first set comprised of 20words and 10 phrases with nasal sounds. The second set comprised of 20 words and 10 phrases with oral sounds. The selected words and phrases were given to 3 native Goan dialect Konkani speakers and 3 native Karwar dialect Konkani speakers to check for familiarity of the words and phrases. They were instructed to rate the words and phrases using a 3 point rating scale where 0 stands for unfamiliar, 1 stands for familiar and 2 stands for very familiar. The 10 words and 5 phrases who were rated as most familiar were selected from in each set and were used for data collection. Complexity of words and phrases which were selected in each set ranged from monosyllable to trisyllableand bisyllable to polysyllables respectively.

### Phase II: Subject selection
Two Groups of subjects were participated in the study. Group 1 comprised of 12native speakers of Konkani language with Goan dialect and Group two comprised of 20 native speakers of Konkani language with Karwar dialect. All the subjects were in the age range of 20 to 40 years. Each subject was evaluated by an experienced speech language pathologist to rule out the presence of speech, language and hearing problems. All subjects were having normal hearing and normal nasal resonance. None of the subjects had history of cleft or velopharyngeal inadequacy and no complaint of upper respiratory tract infection and/or nasal congestion on the date of recording.

### Phase III: Data collection
#### Instrumentation
Nasalview system Version 4 manufactured by Tiger DRS (1998) was used to record the data. It provides real-time measurement related to nasality via a simple, graphic display without any extra Digital signal processing (DSP) hardware. It consisted of head set containing a separator plate with microphones on either side which detects oral and nasal components of the speech which rests on the subject's upper lip. The signal from each of the microphones is filtered individually and digitized by customized electronic modules. The nasalence (%) was obtained by the traditional method which derived the ratio of Nasal to Oral + Nasal sound pressure level. The result is displayed on a scale from 0 to 100%.

### Procedure
Each subject was seated comfortably on a chair in a quiet room. The headset of the Nasometer was placed on the subject's head. The position of the Nasometer head set was adjusted and secured firmly in accordance with the manufacturer's instructions. They were instructed to read the list of words and phrases which were given to them. The calibration of the equipment was carried out prior to the recording of the stimulus as per the instructions given in the manual.

### Data Analyses
The average, minimum and maximum nasalance for each stimulus (10 words and 5 Phrases) in each category were calculated. The obtained data was subjected for subsequent statistical analysis using "SPSS" program package version 20.

### Results and Discussions
Descriptive statistics revealed that, the average nasalence, maximum nasalence and minimum nasalence for Goan Dialect Konkani speakers for oral words were 31.25 (SD=12.16), 48.13 (SD=15.57) & 22.83 (SD=14.53) respectively. Higher nasalence scores were obtained for nasal words i.e. average nasalence obtained was41.11 with a standard deviation of 15.86, the mean maximum and minimum nasalence obtained were 58.43 (SD=15.93) and 23.39 (15.99) respectively for Goan dialect Konkani speakers. Mean scores of average nasalence, maximum nasalence and minimum nasalence for oral words in Karwar dialect Konkani speakers were 45.79 (SD=23.06), 66.13(SD=24.68) and 28.56 (18.17) respectively. For nasal

words, the mean values obtained for average, Maximum and Minimum nasalence scores were 54.01 (SD=22.65), 77.42 (SD=16.48) and 30.27 (SD=18.18) respectively. It was clear from the data that mean scores of nasalence were found to be more in Karwar dialect Konkani when compared to Goan dialect Konkani.

The descriptive statistics of oral and nasal phrases were also obtained in both the dialect. Higher mean scores were obtained for Karwar dialect Konkani speakers in both oral and nasal phrases i.e. the average, maximum and minimum nasalence value obtained for oral and nasal phrases for Karwar dialect Konkani speakers were 47.14 (SD=23.88), 68.30 (SD=24.10) 27.03 (SD=17.76) and 53.62 (SD=21.32), 77.42(SD=16.48), 30.27(SD=18.18) respectively. The average, maximum and minimum nasalence value obtained for oral and nasal phrases for Goan dialect Konkani speakers were 35.11 (SD=8.20), 46.12 (SD=15.95) 19.64 (9.31) and 37.05 (SD=18.42), 60.57(SD=8.49), 18.10 (SD=7.40) respectively. Figure 1 shows the mean nasalence scores of oral and nasal stimuli in Goan Dialect and Karwar dialect Konkani.
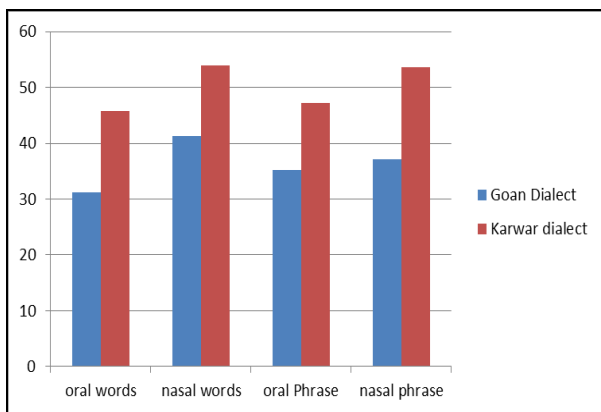


**Fig 1:** Mean nasalence scores of oral and nasal stimuli in Goan Dialect and Karwar dialect Konkani

In the present study, the average nasalence scores were found to be less for oral words when compared oral phrases. Similar findings were reported by Kuppusamy, Ramaswamy and Mariswamy (2013). However for nasal words, the average nasalence score was found to be more when compared to nasal phrases. In typical speaking populations, nasal phonemes are associated with greater nasalance than oral phonemes [13, 14].

MANOVA was carried out to check for the significance among nasalence scores between Goan dialect Konkani speakers and Karwar dialect Konkani speakers. The results indicated significant difference in average nasalence [$F_{(1,30)}$=8.02,P=.008], minimum nasalence [$F_{(1,30)}$=4.83, P=.036] and maximum nasalence [$F_{(1,30)}$=10.71, P=.003] in nasal phrases between Goan dialect Konkani speakers and Karwar dialect Konkani speakers. A significant difference was also seen between groups in Maximum nasalence score of oral words [$F_{(1,30)}$=5.12, P=.031], nasal words [$F_{(1,30)}$=5.58, P=.025] and oral phrases [$F_{(1,30)}$=7.99, P=.008]. The result of the present study can be supported by the findings of [12]. They studied nasalance in four regions of North America, the Mid-West United States, the Mid-Atlantic United States, the Southern United States, and Ontario. The results revealed identified Mid-Atlantic speakers to have increased nasalance values on the all oral Zoo Passage and Rainbow Passage (a phonetically balanced passage) when compared with other dialect regions. They stated that dialect can play some role in nasalance values.

## Conclusions
The present study was a preliminary attempt to investigate nasalence scores in Konkani language. The results indicated differences in nasalence scores between Goan Konkani speakers and Karwar Konkani Speakers. However the results cannot be generalized as the number of subjects in each group was less which is one the limitation of the study. Another limitation is, the current study utilized only female speakers of Kokani language in both the dialect. In Future studies the generalization of the results of the present study could be done by using more subjects with both the genders.

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