

Reliability and Validity of Gujarati Version of Drooling Impact Scale for Sialorrhea in Children with Neurological Impairment

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Abstract: Background: Sialorrhea is an overflow of saliva from the mouth. It can be commonly seen in neurologically impaired children. It occurs because of infrequent swallowing and excess amount of saliva production. For Sialorrhea, no reliable and valid subjective measure exists in Gujarati language. The drooling impact scale (DIS) is designed to measure impact of drooling but it is available in English. Aim and Objectives: This study aimed to translate the English version of DIS into Gujarati language and validate a translated Gujarati version of DIS. Method: According to WHO guidelines, the English version of DIS was translated into Gujarati language using the forward-translations and back-translation method. After translation, the Scale was filled by 50 children (28 Boys and 22 Girls) having Neurological Impairment with Sialorrhea aged 4-18 years (Mean±SD: 7.2±3.02). Internal reliability index Cronbach's alpha and Pearson Correlation coefficient test were used to measure the reliability and validity of the Gujarati version of DIS. All the questions of DIS showed no statistically significant difference between the English version of DIS and the translated Gujarati version of DIS. Result: The results on the reliability and validity of the DIS were satisfactory as the internal reliability index Cronbach's α was 0.90 and Pearson Correlation Coefficient was 0.885 suggesting that the translated Gujarati version was highly correlated to the original English version. Conclusion: The translated Gujarati version of DIS demonstrated good reliability and validity. Its sufficient discriminative and evaluative properties provide the theoretical evidence for further use in research study among Gujarati population.

Keywords: Validity, Reliability, Drooling impact scale, Sialorrhea, Neurological impairment.

1. Introduction

Sialorrhea is an indication of an upset in the coordinated control mechanism of orofacial musculature leading to excessive pooling of saliva in the anterior mouth and resulting in unintentional loss of saliva from the mouth^{1, 2}. Sialorrhea mainly occurs due to neurological disturbance and commonly observed in neurologically impaired children^{3,4}.

In children with neurological impairment, the intricately Co-ordinated activity of swallowing easily disrupted through poor motor skills. Extra oral muscle control problems can also be seen. For instance, poor head control will often result in Sialorrhea, simply because of the combination of poor oral seal and gravity⁵.

Sialorrhea is a physiological phenomenon in infants, which usually resolves after 15-18 months of age⁶. A higher number of typically developing children will continue to drool up until the age of 3 years, especially during eating and drinking. It has been defined as an abnormality in a child more than 4 years of age in the awake status⁷.

The prevalence of drooling, swallowing and feeding problems are 44%, 50.4 % and 53.5% respectively⁸. It has been estimated that 28% of children with neurological impairment are suffer from continuous drooling⁹.

Clinical assessment of Sialorrhea is a multifactorial problem, it requires careful assessment by the multidisciplinary team focusing on medical history and possible etiology¹⁰. Many systems have been advocated for assessment of Sialorrhea.

The Drooling impact scale provides a measure of the impact of drooling on the child and family's life. The scale quantifies the benefits of saliva management obtained by short and medium term treatments. It is 10 bullets questionnaire, whose field of investigation ranges depend on severity and frequency of Sialorrhea and its impact on quality of life. Parents must score every question with 1 to 10 points following a Numeric Pain Rating Scale or a Visual Analogue Scale. Total score of the scale is 100^{10,11,12}.

The first scale specifically designed for Sialorrhea known as Drooling Impact Scale (DIS) was developed in Australia in 2009¹⁰. The DIS was developed with the main aim to evaluate changes in the impact of drooling in children with developmental disabilities and the study proved that the scale was reliable and sensitive. The English language DIS version has already been translated and cross-culturally adapted in French and Brazilian portugese^{13,14}. After searching the literature database such as Pubmed, Scopus, Sciencedirect, Ebscohost etc. did not found any study on the translated Gujarati version of DIS. As a result, this scale was not able to be used in Gujarati population who knows only Gujarati language. Therefore, the present study was taken up to translate the DIS from English to Gujarati language. Thus,

this Gujarati version of DIS would be useful to measure the self-esteem of Gujarati population, who understands only Gujarati language. The Gujarati version of DIS would provide such a questionnaire and this would be another step for a universally accepted outcome measure for Sialorrhea. Therefore, the main aim of this study is to translate into Gujarati and find reliability and validity of Gujarati version of DIS according to WHO guidelines¹⁵.

2. Materials and Methods

An observational study design was adopted. Ethical approval was taken for the study. The subjects were selected based on the inclusion and exclusion criteria designed for the study. These subjects were registered for the study after obtaining the written informed consent form. The subjects were provided with a participant information sheet. The samples included in our study were 50 children. The mean age of the subjects was 7.2 ± 3.02 . The inclusion criteria were children aged between 4-18 years in both gender; child with neurological impairment like cerebral palsy, downs syndrome, seizures, intellectual Disability, mental retardation, delayed development and complaint of Sialorrhea from parents. Subjects who were not willing to take part in the study were excluded.

Process of translation of questionnaire:

For translation of DIS from English language to Gujarati language and for the reliability and validity of Gujarati version of DIS, permission was obtained from the developer of DIS (personal communication through E-mail, Susan Reid). According to WHO forward-translation and back-translation method was used. This method included forward translation, expert panel, back translation and testing of the scale.

Step 1: Forward translation

Two translators (one with the background of medical field and other with no background of medical field) who knew both English and Gujarati language were chosen to translate the scale from English to Gujarati language.

Step 2: Synthesis

Both the Gujarati versions were combined and two professionals who had knowledge of medical terminologies and were known to both the languages (English & Gujarati) developed a synthesized version.

Step 3: Back translation

The synthesized version of the scale was back translated into English language by an independent translator, who knew both English and Gujarati language and had no information of the original scale which was in English language.

Step 4: Expert panel

A bilingual (in English and the Gujarati language) expert panel was convened which included the forward translator, health experts, as well as professionals with skill in scale development and translation. The changes were done in the translated scale based on the suggestions of the expert panel.

Step 5: Testing of the DIS scale

A Pre Final Gujarati version of DIS was given to 50 children who fulfilled the inclusion and exclusion criteria. After 24 hours, the same participants were reevaluated.

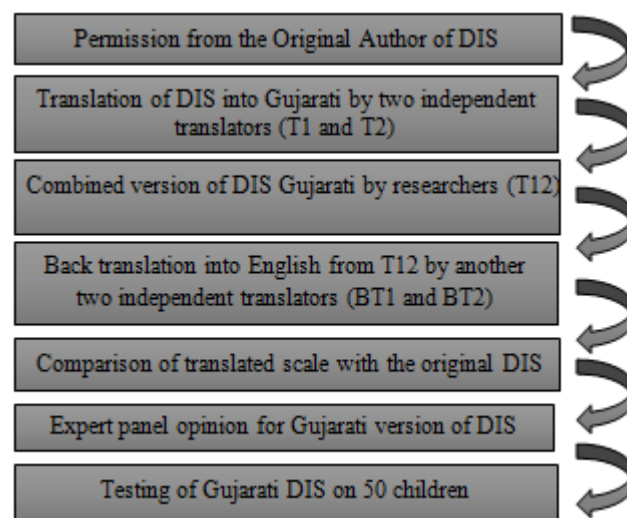


Figure 1: Flow chart of the translation of DIS scale

Statistical Analysis

Statistical package of social science version 26 (SPSS v26) and Microsoft excel 2010 were used to analyzed 50 subject's data. Validity was analyzed using Pearson Correlation test. Interclass correlation coefficient (ICC) was used to assess Test-retest reliability. Internal consistency was assessed using Cronbach's alpha.

3. Results

Descriptive statistics

The subjects recruited in the study were 50 children out of which 28 were boys and 22 were girls. The age of the sample ranged from 4-18 years with mean age 7.2 ± 3.02 years.

Table 1: Frequency of Gender

Gender	Frequency (N=50)	Percentage
Boy	28	56%
Girl	22	44%

Table 1 shows the frequency of gender, in which 28 subjects were boys (56%) and 22 subjects were girls(44%).

Table 2: Age Group

	N	Minimum	Maximum	Mean	Std Deviation
Age (Years)	50	4	18	7.2	3.02

Table 2 shows the Mean and Standard Deviation of the age group in which minimum age were 4 year and maximum age were 18. The mean and standard deviation were 7.2 and 3.02.

Inferential statistics:

The convergent validity and reliability analysis were done.

Convergent validity

The Pearson Correlation Coefficient was 0.885 which suggests that the two scales were significantly positively correlated.

Table 3: Pearson Correlation Coefficient

N	Correlation coefficient r	95% CI for r		P value
		Lower	Upper	
50	0.885	0.95	0.97	P<0.0001

Table 3 shows the validity of DIS. Pearson Correlation Coefficient was 0.885 with 95% of confidence interval, which suggests that Gujarati version of DIS was positively correlated

Reliability Analysis

The internal reliability of the tool was evaluated with Cronbach's alpha. This analysis showed high consistency of the tool, as the index had a value of 0.9025 which is larger than 0.7 necessary for the overall consistency of each instrument.

Table 4: Internal reliability consistency Cronbach's alpha

N	Cronbach's alpha	ICC
50	0.9025	0.8984

Table 4 shows Internal reliability of Gujarati version of DIS. Internal consistency was assessed by Cronbach's alpha, which is 0.9025. Test-retest reliability was assessed using interclass correlation coefficient (0.8984) which suggest excellent reliability.

4. Discussion

The aim of the study was to translate and validate DIS in a sample of Gujarati population. The results show that the scale presents excellent levels of internal reliability. The samples recruited in the study were 50 children out of which 28 were boys and 22 were girls (Table 1). The age of the sample ranged from 4-18 years with mean age of 7.2 ± 3.02 years (Table 2).

The results demonstrated a high and considerable positive association between the two scales in terms of construct validity. The Pearson Correlation Coefficient was 0.885 which suggests that the two scales were significantly positively correlated (Table 3). The present study corroborates the results of validation studies carried out in other countries and with altered self-concept tools.

The internal reliability of the tool was assessed with Cronbach's alpha. This analysis showed high consistency of the tool, as the index had a value of 0.9025 which is larger than 0.7 necessary for the overall consistency of each instrument (Table 4).

Further studies should be undertaken to learn the dynamic configuration of DIS in Gujarati people taking into consideration the sex variable to find out whether there are diverse structures according to sex. On the former side, it would be exciting to contrast a positive version of the tool with the original version and a negative version in diverse samples. It is obligatory to carry out cross-cultural studies with similar samples by means of different variables for instance self-perception, age, sex, or level of studies to set up the construct validity of the tool and its effectiveness to recognize dissimilarities in self-esteem in diverse socio-cultural context.

Susan Reid cited on measurement of drooling, members of a 1990 consortium on drooling concluded that not only objective methods were inadequate, but objective quantification was not really necessary for clinical management or research, because the ultimate test of treatment effectiveness is whether it makes caregiver's lives easier and whether the child's quality of life is improved¹⁶.

Our results validate the uni-dimensional construction of the DIS planned by Susan Reid (2009). Internal reliability and test-retest association were excellent, supporting the consistency of the scale. Additionally, we deem that there is adequate proof to support the construct validity of the scale. Therefore, the results give validation to make use of DIS in the Gujarati population to measure self-esteem.

The study has some limitations. Firstly, sample size were small and Secondly, Content and concurrent validity were not measured. These results showed that DIS is valid and reliable measure for Gujarati population therefore, it can be used in clinics and used as an evidence in future studies.

5. Conclusion

The translated Gujarati version of DIS confirmed excellent consistency and strength. Its satisfactory discriminative and evaluative properties offer the hypothetical evidence for further application in research study among Gujarati population.

6. Acknowledgement

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Conflict of Interest

No conflict of interest.

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None

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