Reliability of the Arabic Glasgow children's benefit inventory

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ABSTRACT

Objectives: To translate the Glasgow Children's Benefit Inventory (GCBI) questionnaire into Arabic language and assess its validity and reliability in scoring the benefit of patients after cochlear implantation in children.

Methods: A cross-sectional study for a group of consecutive pediatric patients who underwent cochlear implantation between November 2018 and February 2020. The GCBI original questionnaire was translated into Arabic language and translated back to English by 2 different experts. The patients/parents were asked to complete the questionnaire given to them.

Results: Seventy children were included in the study. The age at implantation ranged from 7 months to 13 years with a mean of 3.4 years (SD=2.3 years). The mean GCBI score was 52.2 (SD=24.0) ranging from -6.25 to 100.00. The internal consistency of the questionnaire was high (Cronbach's α=0.9). The 4-factor dimensions explained 55.1% of the variance.

Conclusion: The GCBI questionnaire (Arabic version) is reliable tool to evaluate retrospectively the quality of life after an intervention in pediatric age for Arabic speaking population.

Keywords: quality of life, otolaryngology, reliability, factor analysis, cochlear implant, Saudi Arabia

Saudi Med J 2020; Vol. 41 (10): 1135-1138
doi: 10.15537/smj.2020.10.25398

Cochlear implants (CIs) have been recognized as an effective form of hearing rehabilitation for deaf children. Cochlear implants recipients are expected to develop reasonable receptive and expressive communication skills. Star performers are able to join mainstream schools, while others may perform lower but are still expected to demonstrate improved performance with CIs. Objective measures, such as aided audiometry and speech discrimination, aid in the assessment of the functional outcomes of CI devices. However, subjective outcomes are equally important to consider in assessing the benefits of an intervention. Health-related quality of life (QOL) questionnaires serve as subjective evaluation and self-assessment tools of perceived physical and mental outcomes alongside other parameters for specific interventions. Previously, we translated the Glasgow benefit inventory (GBI) after otolaryngology interventions and validated its use for the adult Arabic-speaking population.[1] The Glasgow Children's Benefit Inventory (GCBI) is a generic QOL measure designed by Kubba et al[2] in 2004 for the evaluation of children's benefits from different interventions. This measure has been translated to several languages and has repeatedly demonstrated both validity and reliability.[3-7] Prior to the present study, there was no validated Arabic translation of the GCBI. In this study, we aim to validate the use of an Arabic version of the GCBI after CI among the Arabic-speaking population in Saudi Arabia. An IRB Approval was obtained from the Research Committee Board at King Fahad Specialist Hospital (KFSH), Dammam, Saudi Arabia. All participants were consented and informed about their right of refuse/withdraw from the study without any consequences on the care provided.

Methods. A cross-sectional study was carried out within the Otolaryngology Department of KFSH between November 2018 to February 2020. This study included patients who had undergone CI surgery at KFSH, younger than 16 years of age, and had received at least 6 months of postoperative care. We included any of the patients who consented to participate. Questionnaire forms were collected during a speech therapy session at least 6 months post operatively.

The English GCBI version was translated to an Arabic version primarily, then translated back to English by a different translator. Both forms were evaluated by 2 Otolaryngologists physicians who prepared the final draft to be used in the study (Appendix 1, for Arabic questionnaire). The GCBI is a 5-point Likert scale which has 24 questions. The scores on these questions were averaged, deducted by 3, and then multiplied by 50 to transform the scores into a benefit scale; -100 (maximal negative benefit) / 0 (no benefit) / +100 (maximal positive benefit). Descriptive statistics (means, standard deviations, and frequencies) were used to report demographic data and scale items. A Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy above 0.5 was acceptable. Cronbach's α was used to determine the internal consistency (reliability) of the Arabic GCBI questionnaire (an α-coefficient of 0.70 or higher was considered reliable). The principal

component extraction with Varimax rotation was used to perform an exploratory factor analysis, factor loading of >0.3 was used to allocate items to a scale. The statistical analysis was performed using IBM SPSS Statistics for Mac, version 23 (IBM Corp., Armonk, N.Y., USA).

Results. *Demographic and baseline data*. The present study included 70 participants; 31 (44.3%) males and 39 (55.7%) females. The mean age of implantation was 3.4 years (SD=2.3 years), ranging from 7 months to 13 years. The mean time between the date of surgery and the date of questionnaire participation was 3.8 years (SD=2.4 years), ranging from 6 months to 8.6 years.

Glasgow children's benefit inventory benefit. All the questionnaires were completed by the parents without missing data. All the participants found the questionnaire to be clear and did not have difficulty in understanding the meanings of the items. The mean GCBI score was 52.2 (SD=24.0) with a range of -6.25 to 100.0. The participants scored high on most GCBI items, indicating high benefit from CIs. However, the parents responded with 3 (no change) to questions related to sickness, such as those concerning the common cold, need for medication, doctor visits, or school absences. This was not surprising, as the main health problem of these patients was hearing loss rather than common otolaryngology infections and diseases (Table 1).

Reliability. The KMO measure of sampling adequacy was 0.7 with a significance *p*-value of <0.001 using Bartlett's test of sphericity. The internal consistency of the GCBI was high (Cronbach's α=0.9). Four factors were extracted with an internal consistency of >0.7 when measured for each factor. The extracted 4-factor dimensions explained 55.1% of the total variance. Scale item numbers 6, 7, 17, 19, and 20 were loaded on the first factor (emotion). Item numbers 9, 10, 11, 12, 13, and 15 were loaded on the learning factor, while item numbers 1, 2, 3, 4, 5, 8, and 18 were loaded on the vitality factor. Lastly, item numbers 14, 16, and 21 to 24 loaded on the last factor (physical health). Some items, such as items concerning liveliness, distractibility, school absences, happiness, and leisure, loaded on more than one factor; we elected to assign these items to the most appropriate factors according to the context of each item.

Discussion. This study demonstrated the reliability of the Arabic GCBI for the assessment of the children QOL within the Arabic-speaking population. The English-to-Arabic language translation of this questionnaire was very accurate, and the patients were able to comprehend and answer all the questions without any difficulties. A Cronbach's α test demonstrated that all the subscales had a high degree of internal consistency, indicating that random error is unlikely in the Arabic GCBI and therefore proving its reliability.

Factor analysis is a statistical method used to potentially lower the number of scale items to unobserved variables called factors. This method can show that multiple observed variables have similar patterns of responses because they are all associated with a latent, indirectly measured variable. The original English version of the GCBI was validated for the assessment of children's QOL after an intervention.[2] Four factors were extracted, and it accounted for 62% of the variance between them.[2] The Arabic GCBI 4-factor solution explained 55.1% of this variance. Further, 14 of the 24 scale items of the Arabic GCBI had similar factor loading to those of the original English version. The validity of the Arabic version of the GCBI was similar to that of the German version (55.7%).[8] However, in the validation of the Portuguese version, 2 subscales (psychosocial health and physical health) were found to account for 66.85% of the variance.[9]

The high benefit derived from CIs was similar to those reported by previous studies in the literature.[10] Using the GCBI, Dev et al[11] reported improved QOL in 69 children after CIs. They also reported better outcomes among those who had implants for longer periods of time. Sparreboom et al[12] also used the GCBI and found significant improvements in QOL after sequential cochlear implantation, which continued to improve over 24 months. Others have also reported no significant differences between the QOL scores of CI recipients and those of their normal-hearing peers.[13]

Study limitations. This study has added to the Arabic literature a valuable questionnaire for QOL assessment. However, the limitation of this study is the relatively low number of patients. Also, correlating the questionnaire scores to another outcome measure such as speech performance or hearing level after CI would give a better comprehension of the QOL.

Disclosure. Authors have no conflict of interests, and the work was not supported or funded by any drug company.

Table 1 - Factor loadings (≥0.30) Glasgow children benefit inventory questionnaire (orthogonal rotation, principal component extraction).

No.	Factors	Mean (SD)	h^2	Emotion	Learning	Vitality	Physical health
1	Overall life	4.8 (0.5)	0.539			0.692	
2	Things they do	4.5 (0.7)	0.595			0.712	
3	Behaviors	4.5 (0.8)	0.561		0.312	0.67	
4	Progress	4.2 (0.9)	0.572	0.372		0.642	
5	Liveliness	4.2 (0.9)	0.7	0.66		0.515	
6	Sleep	3.5 (0.9)	0.601	0.681			
7	Food	3.6 (0.9)	0.492	0.662			
8	Self-consciousness	4.4 (0.8)	0.379			0.52	
9	Family harmony	4.3 (1.1)	0.627		0.749		
10	Fun with friends	4.1 (1.1)	0.646		0.775		
11	Embarrassment	3.6 (10)	0.318		0.411		
12	Distractibility	3.7 (1.0)	0.457	0.456	0.469		
13	Learning	4.5 (0.8)	0.63		0.734		
14	Absences from school	3.6 (0.9)	0.496	0.394	0.457		0.336
15	Concentration	4.0 (1.0)	0.557		0.67		
16	Irritability	3.4 (1.0)	0.517				0.652
17	Self-esteem	4.1 (0.9)	0.415	0.602			
18	Happiness	4.5 (0.8)	0.564	0.611		0.404	
19	Confidence	4.4 (0.8)	0.527	0.674			
20	Selfcare	4.2 (0.9)	0.463	0.606			
21	Leisure	4.2 (0.9)	0.377	0.393			0.396
22	Colds	3.3 (0.7)	0.755				0.845
23	Visits to doctor	3.5 (1.0)	0.726				0.823
24	Need for medication	3.2 (0.7)	0.706				0.778

h^2: communalities

In conclusion, cochlear implantation has recognized objective results on speech performance after the surgery. However, QOL is a major indicator of the subjective results post implantation. The current study validated the Arabic GCBI to be used as a reliable subjective tool for evaluation of QOL after cochlear implantation among the Arabic-speaking population. Nonetheless, the Arabic-GCBI is a nonspecific form of questionnaires and can be used in children after any intervention.

Received 8th June 2020. Accepted 7th September 2020.

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Acknowledgment. *The authors acknowledge the support of the Saudi society of otolaryngology-head and neck surgery. Also, the authors gratefully acknowledge Scribendi (www.scribendi.com) for English language editing.*

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Appendix 1 - The Arabic version of Glasgow children benefit inventory.

استبيان عمليـة الانف والاذن والحنجرة (أطفال)*

- هل اثرت العملية بشكل أفضل ام اسوأ على حياة الطفل بشكل عام؟
- هل اثرت العملية على الأشياء التي يقوم بأدائها الطفل؟
- هل تغير سلوك الطفل بعد العملية الى الافضل او الى الاسوأ؟
- هل أثرت العملية على نمو الطفل وتطوره؟
- هل أثرت العملية على حيوية الطفل خلال اليوم؟
- هل أثرت العملية على نوم الطفل اثناء الليل؟
- هل أثرت العملية على استمتاع الطفل بالأكل؟
- هل أثرت العملية على الوعي الذاتي للطفل في وجود اناس اخرين؟
- هل أثرت العملية على مدى اندماج الطفل مع باقي افراد العائلة؟
- هل أثرت العملية على قدرة الطفل امضاء الوقت والاستمتاع مع الاصدقاء؟
- هل اثرت العملية على احساس الطفل بالخجل من الاخرين؟
- هل اثرت العملية على التشتت الذهني للطفل؟
- هل اثرت العملية على تعلم الطفل؟
- هل اثرت العملية على كمية الوقت الذي يغيبه الطفل عن الحضانة. مركز الالعاب او المدرسة؟
- هل اثرت العملية على مدى قدرة الطفل على التركيز في عمل معين؟
- هل اثرت العملية على شعور الاحباط وسرعة الغضب لدى الطفل؟
- هل أثرت العملية على شعور الطفل تجاه نفسه؟
- هل أثرت العملية على مدى سعادة الطفل وابتهاجه؟
- هل أثرت العملية على ثقة الطفل بنفسه؟
- هل أثرت العملية على قدرة الطفل على العناية بنفسه حسب تقييمك كالغسيل واللبس واستخدام الحمام؟
- هل أثرت العملية على قدرة الطفل على الاستمتاع بالأنشطة الترفيهية كالسباحة والرياضة واللعب الجماعي؟
- هل أثرت العملية على مدى عرضة الطفل ان يصاب بالزكام أو الالتهابات؟
- هل أثرت العملية على مدى حاجة الطفل زيارة الطبيب؟
- هل أثرت العملية على كمية الأدوية التي يحتاجها الطفل؟

* يوجد ٥ إجابات تحت كل سؤال يختار المشارك بالاستبيان أحدها: (١) أسوأ بكثير. (٢) أسوأ قليلا / بعض الشيء. (٣) لا تغيير. (٤) أفضل قليلا / بعض الشيء. (٥) أفضل بكثير.