

ANNEXES

DU MEMOIRE

En vue de l'obtention du
Certificat de Capacité d'Orthophoniste
présenté par

STENGER Lise

**Caractéristiques masticatoires chez des
patients atteints de malformation
congénitale du cervelet: étude auprès
d'une population de 38 patients**

MEMOIRE dirigé par

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Lille – 2021

A1 : Formulaire de consentement d'utilisation des données du 2M2C

AUTORISATION

Merci de bien vouloir indiquer ci-dessous les noms, professions, adresses des médecins ou paramédicaux auxquels vous souhaitez que le bilan soit envoyé :

A noter que les parents et le prescripteur du bilan recevront systématiquement le compte rendu

1.

2.

3.

4.

5.

J'accepte que les données recueillies ce jour soient utilisées de manière anonyme à des fins d'étude et de recherche

Je n'accepte pas

Fait à Lille, le/...../..... .

NOM lisible en majuscules :

Lien de parenté avec l'enfant :

Signature

A2 : Normes internationales du TOMASS enfant et adolescent, écart-type et intervalle de confiance à 95% par âge et genre pour le TUC Classic™ cracker

Test Of Masticating And Swallowing Solids (TOMASS): for De Beukelaer TUC Classic™									
Sex	Age	Discrete bites per cracker		Masticatory cycles per cracker		Swallows per cracker		Total time (s)	
		Mean	95% CI	Mean	95% CI	Mean	95% CI	Mean	95% CI
Males	4;00-5;11	6.40	4.84-7.95	61.90	48.13-75.66	2.40	1.70-3.09	70.90	52.64-89.15
	6;00-7;11	3.70	2.48-4.91	44.00	34.85-53.14	2.70	1.87-3.52	45.90	37.78-54.01
	8;00-9;11	4.60	3.57-5.62	45.00	35.23-54.76	2.80	1.79-3.80	50.20	34.82-65.57
	10;00-13;11	3.50	2.42-4.57	44.60	25.79-63.40	2.90	1.23-4.56	38.70	26.34-51.05
	14;00-17;11	2.90	2.49-3.30	35.10	28.42-41.77	2.50	1.99-3.00	31.70	26.67-36.72
Females	4;00-5;11	7.40	5.57-9.22	68.00	51.16-84.83	3.20	1.99-4.40	65.30	55.39-75.20
	6;00-7;11	5.70	3.73-7.66	62.20	47.91-76.48	3.20	2.38-4.01	62.50	49.86-75.13
	8;00-9;11	4.80	3.08-6.51	42.00	32.03-51.96	3.40	1.51-5.28	53.60	37.98-69.21
	10;00-13;11	3.90	3.18-4.61	38.80	31.30-46.29	2.50	1.72-3.27	41.50	34.76-48.23
	14;00-17;11	3.50	2.89-4.10	36.30	31.87-40.72	2.30	1.47-3.12	38.70	29.92-47.47

A3 : Formulaire de consentement personnel proposé aux patients vus en bilan



FORMULAIRE DE CONSENTEMENT

DATE : / /

↓ (Une seule ligne à remplir si vous êtes le patient et que vous êtes majeur)

NOM ET PRENOM de l'enfant :

NOM ET PRENOM de l'adulte responsable :

NOM ET PRENOM du patient majeur :

Date de naissance du patient : / /

Lieu de naissance du patient :

ADRESSE :

.....
.....
.....
.....

TEL : /

E-mail : @

J'accepte que les données recueillies ce jour soient utilisées de manière anonyme à des fins d'étude et de recherche

Je n'accepte pas

Fait à Lille, le / /

NOM du patient lisible en majuscules : Nom de l'adulte responsable si le patient est mineur

Signature du patient majeur ou de l'adulte responsable du patient mineur

A4 : Extrait de l'article original « International standardisation of the test of masticating and swallowing solids in children », Frank, U., Van Den Engel-Hoek, L., Nogueira, D., Schindler, A., Adams, S., Curry, M. et Huckabee, M.-L. .

Summary

The Test of Masticating and Swallowing Solids (TOMASS) is a validated assessment tool measuring the efficiency of solid bolus intake by four quantitative parameters: discrete bites, masticatory cycles, swallows and time to ingest a single cracker. A normative database for adults (20-80+ years) has previously been established. The objective of this study was to investigate the applicability and reliability of the TOMASS in children and adolescents (TOMASS-C) and to establish the normative database for this younger population. We collected data from 638 participants (male: 311, female: 327) in five age groups (4-18 years) with five different but very similar test crackers in four countries. Significant effects of bolus type (cracker), age group and gender on the TOMASS parameters were identified, requiring stratification of the TOMASS-C database by these variables. Intra-rater reliability was excellent (ICC > 0.94) for all parameters; inter-rater reliability was moderate for “number of swallows” (ICC = 0.54), good for “bites” (ICC = 0.78) and “time” (ICC = 0.82), and excellent for “masticatory cycles” (ICC = 0.96). The “Test of Masticating and Swallowing Solids in Children (TOMASS-C)” was identified to be a reliable diagnostic tool for the comprehensive measurement of discrete oral stage components of solid bolus ingestion, standardised by a large normative database that covers age groups from preschoolers to young adults. While differences between gender groups were less pronounced than in the adult population, previous results relating to changes in masticatory and swallowing as a function of age are confirmed by our data.

1 | INTRODUCTION

Clinical assessment of swallowing is conducted to evaluate the efficiency of oropharyngeal swallowing and to identify signs of dysphagia. Usually, methods of visual and tactile inspection of oral structure and function are applied as well as observation of oral intake. The validity of these methods, however, is limited by the qualitative character of the measurements, as the observations cannot be compared to normative data and the results are highly dependent on the clinical experience of the examiner.

The “Test of Masticating and Swallowing Solids (TOMASS) was developed as a high-level assessment method to evaluate oral pharyngeal efficiency for solid bolus intake. [...] While the TOMASS can be considered an applicable and well-validated tool to assess the effectiveness of solid bolus ingestion in adults, no comparable, comprehensive and easy-to-perform quantitative instrument is available for children so far.

In the paediatric population, the measurement of oropharyngeal function is particularly difficult, as the procedures and instructions must be brief and easy-to-perform. Furthermore, several factors have to be considered to account for developmental changes during maturation, such as the development of transverse tongue movements and maturation of the swallowing pattern beginning with the infant's first experiences with semisolid and solid food ingestion. At the age of four, healthy children have acquired a mature swallowing pattern. At the age of six, all deciduous teeth have erupted and none would have been shed. An adult-like chewing pattern, however, is achieved much later when the child is about 12 years old and is certainly influenced by the eruption of teeth and second dentition that enables the child to fracture different types of

foods to an appropriate final bolus particle size for safe swallowing. This period aligns with the end of the first growth phase for height which has been described to be closely related to mandibular growth velocity. Differences in body growth and cognitive development are related to gender, with girls showing earlier growth and cognitive psychological spurts during primary school age and boys catching up during puberty. Developmental changes and gender differences in parameters related to oral intake of different bolus types in children from 2 to 8 years have been reported in a series of studies by Gisel and colleagues. They established the reliability of the measurements “time” (per bite) and “masticatory cycles” for this age range, reported a decrease in “masticatory cycles” and “time” as a function of age and higher “time/cycle ratios” in their female participants. No data, however, are available for children and adolescents older than 8 years. [...]

2 | METHODS

2.1 | Participants

Data were collected from healthy children (4-18 years) in five different countries: the Netherlands, Germany, New Zealand, Portugal and Italy. Participants were included if there was no reported history of dysphagia or neurological disease. Children were clustered into five age groups with narrow age ranges to account for the developmental processes in masticatory and swallowing function: group 1: 4;0 to 5;11 (years;months), group 2: 6;0 to 7;11, group 3: 8;0 to 9;11, group 4: 10;0 to 13;11 and group 5: 14;0 to 17;11. No data in age group 1 (4;0 to 5;11) were collected in Portugal.

2.2 | TOMASS-C: Materials and procedure

As with the adult version of the TOMASS, The TOMASS-C involves ingestion of a cracker with the instruction to “eat this as quickly as is comfortably possible and when you’re finished, say your name”. While the participant eats the cracker, the examiner observes and counts four parameters associated with effectiveness of oral ingestion: (a) “number of bites,” (b) “number of masticatory cycles,” (c) “number of swallows” and (d) “total time” needed to finish the cracker (Table 1).

TOMASS-C parameters	Definition
Bites	Number of bites taken to finish the cracker
Masticatory cycles	Up-down movement of the jaw does not include the rotatory jaw and tongue movements used to clear residue in the oral cavity
Swallows	Observed from the movement of the thyroid cartilage
Time	Duration of time needed to finish the cracker measured with a digital stopwatch START: when the cracker reaches the patient's lips STOP: when the patient says his/her name

TABLE 1 Definition of the TOMASS-C parameters

All measurements refer to numbers taken to finish one cracker.

[...]

3 | RESULTS

[...]

3.2 | Influence of age and gender on the TOMASS parameters

3.2.1 | Influence of age and gender across all data sets

Across all data sets, we found main effect of age ($F(16,1910.044) = 15.408, P < 0.001$) and a main effect of gender ($F(4,625) = 3.134, P = 0.014$) but no significant age X gender interaction ($F(16,1910.044) = 0.932, P = 0.532$). Age affected multiple TOMASS-C parameters (bites: $F(4,628) = 42.637, P < 0.001$; masticatory cycles: $F(4,628) = 18.401, P < 0.001$; time: $F(4,628) = 25.835, P < 0.001$), but not the number of swallows ($F(4,628) = 1.198, P = 0.310$). A gender effect was only evident for the parameter “number of bites” ($F(1,628) = 10.342, P = 0.001$) with boys needing fewer bites to finish the cracker than girls. Post hoc analyses of differences between age groups suggest that measurements and data variability decreased as a function of increasing age, with the adolescent participants needing fewer bites, masticatory cycles and time to ingest the cracker than the younger participants (Table 3).

[...]

4 | DISCUSSION

[...]

4.1 | Age effects

Differences between the younger and the older participants were found for “number of bites,” “masticatory cycles” and the total “time” needed to finish the cracker, while there was no difference between age groups with respect to the number of swallows. In the light of the developmental milestones of masticatory and swallowing function, this result is not surprising, as most participants had likely already acquired a mature swallowing pattern by the age of 4 years. Therefore, the number of swallows required to ingest a single cracker was not different in younger vs older children. Masticatory function, however, underlies continuous developmental processes until an adult-like pattern is achieved by the age of about 12 years. Thus, the continuous decrease in the number of bites, masticatory cycles and total time in our study sample might reflect milestones of masticatory development and, thus, the progression in oropharyngeal solid bolus ingestion. [...]

4.2 | Gender effects

In line with results of the adult TOMASS validation study with adults, we found a main effect of gender in our younger population with boys needing less “bites” to finish the cracker than girls. Previous results by Gisel and colleagues, who found higher “time/cycle ratios” in girls, were not replicated as we did not find gender-related differences in the parameters “masticatory cycles” and “time.” [...]

5 | CONCLUSION

In summary, this study provides a standardisation of the “Test of Masticating and Swallowing Solids in Children (TOMASS-C) for the comprehensive measurement of discrete oral stage components of solid bolus ingestion. In clinical application, the normative database that has been established in this project will allow for a differential evaluation of four different components of oral solid bolus ingestion. For application in paediatric patients with swallowing impairments, we suggest complementing the TOMASS with other quantitative tests of mastication, such as overall performance with the “Karaduman Chewing Performance Scale” or endurance in mastication with the “6-Minute Mastication Test”. This package could provide a complete and quantitative overview of the oral efficiency for solid bolus intake in order to develop tailor-made therapy.

[...]

A5 : Variables étudiées

Variables étudiées

Variables Démographiques

- **Sexe** ; variable nominale
1 = garçon
2 = fille
- **Age** : âge des participants en années et en mois ; variable numérique
Répartition en 2 groupes d'âge : 1 = [3 ans;8 ans] et 2 = [9 ans;17 ans]

Variables oro-myo-faciales et masticatoires

- **Respiration** ; variable nominale
1 = buccale
2 = nasale
3 = mixte
- **Mastication** ; variable nominale
1 = présente
2 = présente mais immature (regroupement de divers critères : mâchonnement, mastication asymétrique, mastication bilatérale, mastication lente avec une fatigabilité)
3 = absente
- **Déglutition** ; variable nominale
1 = fonctionnelle (adulte ou infantile)
2 = dysfonctionnelle
- **Alimentation** ; variable nominale
1 = alimentation normale
2 = alimentation avec texture adaptée (hachée ou mixée)
- **Dysmorphose** ; variable nominale
1 = absence de dysmorphose
2 = présence de dysmorphose

Variables du TOMASS étudiées

- **Morsures** : nombre de morsures du TUC ; variable numérique
1 = réalisé
2 = données manquantes (non-proposé ou patient trop jeune)
3 = non-réalisable (examen clinique déficitaire empêchant la passation du TOMASS)

Cotation du TOMASS :

- 1 = norme
- 2 = déficitaire

- **Cycles** : nombre de cycles masticatoires ; variable numérique
1 = réalisé
2 = données manquantes (non-proposé ou patient trop jeune)
3 = non-réalisable (examen clinique déficitaire empêchant la passation du TOMASS)

Cotation du TOMASS :

- 1 = norme
- 2 = déficitaire

- **Temps** : temps total pour manger le TUC ; variable numérique
1 = réalisé
2 = données manquantes (non-proposé ou patient trop jeune)
3 = non-réalisable (examen clinique déficitaire empêchant la passation du TOMASS)

Cotation du TOMASS :

- 1 = norme
- 2 = déficitaire

Questions auxquelles nous souhaitons répondre

Questions principales :

- 1) A travers la description et l'occurrence des variables démographiques, oro-myo-faciales et masticatoires de la population, est-il possible de décrire un profil de la population ?
- 2) Les scores au TOMASS de la population sont-ils considérés comme déficitaires par rapport aux normes du TOMASS ? Existe-t-il des critères d'évaluation du TOMASS plus déficitaires que d'autres dans la population étudiée ?

Autres questions secondaires :

- 3) En fonction du sexe, y a-t-il une différence objectivable d'occurrence des variables oro-myo-faciales et masticatoires dans la population ?
- 4) Selon les difficultés recensées dans les variables oro-myo-faciales et masticatoires, est-il possible de prédire des scores déficitaires au TOMASS ?