Caregiver oral health literacy: relationship with socioeconomic factors, oral health behaviors and perceived child dental status

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Objecti**ve*: To assess associations between caregiver oral health literacy (OHL) and socioeconomic factors, child and caregiver's oral health behaviors and perceptions of oral health status. ***Basic research design: Cross-sectional study. ***Clinical setting***: University pediatric dentistry clinic. ***Participants***: 205 pairs of caregivers and children aged 6 to 12-years undergoing dental treatment. ***Method***: A questionnaire was sent to caregivers enquiring about socioeconomic factors, oral health behaviors, perceptions of own and child oral health. The clinical dental status of the children was recorded with the DMFT/dmft index. ***Main outcome measure***: OHL was measured by the Brazilian version of the Rapid Estimate of Adult Literacy in Dentistry (BREALD-30). Descriptive analysis, unadjusted and adjusted logistic regression, odds ratio and confidence interval were calculated considering a significance level of 5%. ***Results***: The frequency of poor OHL was 21%. In adjusted analysis caregivers with 8 years or less of schooling had a 3.72 (95% CI 1.74-7.95) times greater chance of have poor OHL. Caregivers who perceived their child to have poor oral health were 2.70 (95% CI 1.10-6.63) times more likely to have poor OHL. ***Conclusions***: Poor oral health literacy was more common among caregivers with less schooling and a poor perception of their child's oral health. OHL was unrelated to monthly family income, child dental health status, perception of own oral health or child or caregiver oral health behaviors.

Keywords: health literacy; oral health; children; health behavior.

Introduction

Oral Health Literacy (OHL) can be defined as "the degree for which a person has the capacity to obtain, process and understand basic oral and craniofacial health information and services needed to make appropriate health decisions" (Institute of Medicine, 2004; Lynn *et al.*, 2004). Educative and preventive strategies during dental treatment based on a previous adequate measurement of OHL can be key to patients correctly understanding the health-illness process and making better decisions to improve oral health in the family setting (Carthery-Goulart *et al.*, 2009; Stowers *et al.*, 2013).

Poor OHL can impact the capacity of patients to attend dental appointments and to participate actively in dental treatment decision making (Calvasina *et al.*, 2016). It has been associated with greater prosthetic need, dental caries, malocclusion, temporomandibular joint problems, periodontal diseases, a lack of knowledge about oral health status, poor oral health, poor health behaviors, poor adherence to preventive treatments and chronic diseases (Miller *et al.*, 2010; Eno *et al.*, 2013). Early detection of poor OHL can improve professional-patient communication in the clinical setting or in the community.

Poor OHL in adults can directly impact their children's oral health, because children depend on their caregivers to access to oral health services and acquire healthy behaviors. An appropriate perception on the oral status of their children can lead adults to pursue dental preventive care and to have better adhesion to treatment (Vilella *et al.*, 2016a; Macek *et al.*, 2017). A North Carolina study observed children to have better oral health if their caregivers had higher levels of OHL (Miller *et al.*, 2010). In Hong Kong 5-year-olds, higher caries activity and dental plaque levels were associated with low caregiver OHL and schooling and family income (Bridges *et al.*, 2014).

The literature is inconclusive on how dental treatment outcomes, oral health behaviors, oral health perceptions are associated with OHL (Firmino *et al.*, 2018). This study aimed to assess the association between caregiver OHL and socioeconomic factors, child and caregiver oral health behaviors, and perceptions of dental status.

Method

This cross-sectional study was approved by the Human Research Ethics Committee of the Federal University of Parana, under the number 1.002.225/2015 and followed the Declaration of Helsinki standards.

We recruited 236 pairs of children undergoing treatment in a university-based pediatric dentistry clinic and their caregivers. Precision estimates were based on 15% of adults having poor oral health literacy (data obtained from a pilot study), an absolute precision of 5% (difference between real and estimated prevalence) and a significance level of 5%. A further 20% was added to compensate for possible losses, resulting in an intended sample of 236 pairs (Lwanga and Lemeshow, 1991).

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A consecutive sample of children aged 6 to 12 years attending for dental treatment between June and November 2015 and their respective caregivers who signed and returned the informed consent form were recruited. Children with orthodontic appliances and participants with incomplete questionnaires were excluded.

A pilot study was carried out in a convenience sample of 20 pairs of caregivers and children. These participants were excluded from the main study.

A self-administered questionnaire, specifically developed for the study, enquired about caregiver gender, age and education (dichotomized as up to 8 years and more than 8 years), family income (dichotomized as up to 2 Brazilian monthly minimum wages and more than 2 Brazilian monthly minimum wages), the caregiver's and child's last dental visit (dichotomized as up to 1 year and more than 1 year ago) and the reason for the caregiver's and child's last dental visit (dichotomized as preventive or problem/pain). Perceived oral health was assessed with the question "How do you consider the condition of your mouth and teeth?" (categorized as great, good, reasonable and poor) and caregiver's perception of their child's oral health was assessed by asking "What do you think about the oral health condition of your children?"(possible answers were great, good, reasonable and poor). This variable was dichotomized into good (great/good) or poor (reasonable/poor).

OHL was assessed with the Brazilian version of the Rapid Estimate of Adult Literacy in Dentistry, the BREALD-30 (Junkes et al., 2015). The caregivers were invited to read the 30 words out loud for the examiner in a private room. For each word read and pronounced correctly the examiners assigned one point. The OHL score could range from 0 to 30. The higher the score the higher the oral health literacy level (Junkes et al., 2015). BREALD-30 was defined as the dependent variable and was dichotomized in accordance with the score of the first quintile sample (up to 19 points – poor OHL and more than 19 – high OHL) (Vann et al., 2010).

One examiner, blinded to the caregivers, OHL, performed the clinical data collection following the World Health Organization recommendations for DMFT and dmft indexes (WHO, 2013). Children were clinically evaluated in a dental chair under artificial light by one examiner using protective equipment, dental mirror and probes. This variable was dichotomized as DMFT/dmft = 0 or DMFT/dmft ≥ 1.

Training and calibration for BREALD-30 was performed according to the protocols defined by Vilella et al. (2016b). Training was based on a discussion of the theoretical basis of the instrument. Later, the examiners watched and discussed videos of individuals reading the words of BREALD-30. Then, the researcher who was considered a gold standard (JVNBM) and the examiners watched fifteen new videos, of individuals reading the words of BREALD-30. Kappa values were calculated to obtain the inter-examiner agreement (kappa >0.88). Ten days later, the same videos were watched in a random order, and kappa values were calculated for the intra-examiner agreement (Kappa > 0.92).

The examiners were also trained and calibrated to perform dental clinical examinations (DMFT/ dmft index) according to the World Health Organization (2013)

protocols. The examinations were carried out with 15 children and the results of the gold standard (JVNBM) and the examiners were compared to determine inter-examiner reliability (Kappa = 0.81). After 14 days, the same children were re-examined, with intra-examiner Kappas of 0.90.

After descriptive analyses, predictors of OHL were identified in forward stepwise unadjusted and adjusted logistic regression. Independent variables with p-values lower or equal 0.05 were remained in the adjusted models, with the results expressed as Odds Ratios and 95% Confidence Intervals. Missing data were excluded from the analysis. Analyses were conducted in SPSS 20.0 software (SPSS, Chicago, IL, USA)

Results

Of the 236 pairs of children and caregivers potentially eligible to participate, 31 did not return an informed consent form signed or returned incomplete questionnaires. Thus, 205 pairs of children and caregivers were confirmed eligible and provided full data (Response rate=86.8%).

The frequencies of all independent variables in relation to BREALD-30 scores are shown on Table 1. The mean ages of caregivers and children were 35.8 years (SD 8.5) and 8.3 years (SD 1.7) respectively. Most (84.9%) caregivers were female and 50.7% of the children were male. The mean monthly family income was R$ 2372 (SD 1644) (USD $606, at the time data were collected) and 67.5% of the caregivers had more than 8 years of schooling. The frequency of higher levels of OHL was 79% and the mean score was 22.91 (SD 4.94) (Table 2).

Table 3 presents the unadjusted and adjusted logistic regression models for predictors of OHL scores. The unadjusted regression showed an association between BREALD-30 and caregivers' schooling, monthly family income, caregivers' last dental visit, caregivers' perception of the oral health of children and the DMFT index. The adjusted analysis showed that caregivers with 8 years or less of schooling had a 3.72 (CI 1.74 - 7.95) times greater chance of have poor OHL and those with a poor perception of the oral health status of children had a 2.70 (CI 1.10 - 6.63) times greater chance of have poor OHL, controlled by monthly family income, caregivers' last dental visit and the DMFT index.

Discussion

This study found that caregivers' oral health literacy was predicted by their level of education and their perception of the oral health of their child, but was not predicted by the time since their last dental visit, monthly family income or the child's dental clinical status.

Caregivers with low OHL tended to have negative perceptions of their child's oral health, whereas OHL was unrelated to the child's clinically assessed dental status, showing that the perception of caregivers with poor OHL on their children's oral health status is dissimilar to the children's experience of dental caries. This result is important because the lack of skills required to identify the first signs of oral diseases or to take appropriate decisions concerning oral health could have consequences such as not seeking adequate dental care (Baskaradoss, 2016) and

Table 1. Frequencies of independent variables in relation to oral health literacy

		BREALD-30	
		High	Low
Independent variables	N (%)	N (%)	N (%)
Caregiver's schooling*			
>8 years	137 (67.5)	121 (75.6)	16 (37.2)
≤ 8 years	66 (32.5)	39 (24.4)	27 (62.8)
Monthly family income			
>2 MW	134 (65.4)	112 (69.1)	22 (51.2)
Up to 2 MW	71 (34.6)	50 (30.9)	21 (48.8)
Caregiver's last dental visit			
≤ 1 ano	149 (72.7)	123 (75.9)	26 (60.5)
>1 ano	56 (27.3)	39 (24.1)	17 (39.5)
Reason for the caregiver's last dental visit*			
Prevention	73 (36)	61 (37.9)	12 (28.6)
Problem/ pain	130 (64)	100 (62.1)	30 (71.4)
Child's last dental visit*			
≤ 1 year	162 (79.8)	130 (80.7)	32 (76.2)
>1 year	41 (20.2)	31 (19.3)	10 (23.8)
Reason for the child's last dental visit*			
Prevention	78 (38.4)	64 (39.8)	14 (33.3)
Problem/pain	125 (61.6)	97 (60.2)	28 (66.7)
Caregiver's perception of oral health of child			
Good/ reasonable	172 (83.9)	143 (88.3)	29 (67.4)
Bad	33 (16.1)	19 (11.7)	14 (32.6)
Caregiver's perceived oral health			
Good/ reasonable	63 (30.7)	55 (34)	8 (18.6)
Bad	142 (69.3)	107 (66)	35 (81.4)
DMFT of child			
0	128 (62.4)	108 (66.7)	20 (46.5)
≥1	77 (86.3)	54 (33.3)	23 (52.5)
Dmft of child			
0	28 (13.7)	20 (12.3)	8 (18.6)
≥1	177 (86.3)	142 (87.7)	35 (81.4)

Note: MW – minimum wage in Real (1 MW = R$ 937.00 or USD 288.97). DMFT (decayed, missing and filling teeth).

Table 2. Distribution of OHL scores in 205 caregivers

	OHL (BREALD-30) %	Mean (SD)
Low	21	15.44 (3.94)
High	79	24.89 (2.83)
Total	100	22.91 (4.94)

other adverse oral health behaviors (Vann *et al*., 2010). However, studies that consider caries experience as a dependent variable have found that child dental caries experience was associated with poor caregiver OHL (Bridges *et al*., 2014; Miller *et al*., 2010).

Vann et al. (2010) showed that caregivers with poor OHL were more likely to report that their child had poor oral health and to have poor oral health knowledge. The authors also found poor OHL to be associated with no daily brushing and nighttime bottle use. Caregivers' perceptions of their child's oral health status has been found to be more weakly associated with their oral health-related quality of life among caregivers with poor OHL (Divaris *et al*., 2014). Unlike some studies (Miller *et al*., 2010; Garrett *et al*., 2012) which did not find any associations, these divergent results can be explained by the fact that both studies were conducted in other countries with different educational systems and cultural environment, and one the study (Miller *et al*., 2010) did not have a representative sample, adding a possible bias. A systematic review and meta-analysis involving these variables concluded that the results from this subject were inconclusive and further well-designed studies are necessary (Firmino *et al*., 2018).

Low caregiver OHL was also associated with lower levels of education. These results are compatible with Lee et al. (2011) who showed a positive correlation between OHL and educational level, and Vilella and colleagues' (2016a) study involving pregnant women. Low level of schooling has been associated with poor health outcomes (Hooley *et al*., 2012) and may be reflected in the lack of knowledge concerning selfcare and taking care of children (Vilella *et al*., 2016a; Macek *et al*., 2017). Furthermore, there is a limited access to people with low-income, low schooling

Table 3. Unadjusted and Adjusted Logistic Regression among independent variables and low levels of OHL (BREALD-30). Curitiba, Brazil.

Independent variables		Unadjusted OR	Unadjusted CI (95%)	Adjusted* OR	Adjusted* CI (95%)
Caregivers' schooling	>8 years	1		1	
	≤ 8 years	**5.23**	**(2.56; 10.71)**	**3.72**	**(1.74; 7.95)**
Monthly family income	>2 MW	1		1	
	Upto 2 MW	**2.13**	**(1.08; 4.24)**	1.86	(0.87; 4.01)
Caregivers' last dental visit	≤ 1 year	1		1	
	>1 year	**2.06**	**(1.01; 4.19)**	1.92	(0.87; 4.28)
Reason for the caregivers' last dental visit	Prevention	1			
	Problem/ pain	1.52	(0.72; 3.20)		
Children's last dental visit	≤ 1 year	1			
	>1 year	1.31	(0.58; 2.94)		
Reason for the children's last dental visit	Prevention	1			
	Problem/ pain	1.32	(0.65; 2.70)		
Caregivers' perception on oral health of children	Good/ reasonable	1		1	
	Bad	**3.63**	**(1.64; 8.07)**	**2.70**	**(1.10; 6.63)**
Self-perception on oral health	Good/ reasonable	1			
	Bad	1.02	(0.46; 2.27)		
DMFT index	0	1		1	
	≥1	2.24	(0.97; 5.17)	1.73	(0.81; 3.71)
dmft index	0	1			
	≥1	0.616	(0.25; 1.51)		

*Adjusted analysis with Enter method including only significant variables (p<0.05).
OR – Odds Ratio; CI – Confidence Interval.
Values in bold indicate CI does not include 1

and poor OHL to places where adequate information on oral health is available (Lee *et al*., 2011; Vilella *et al*., 2016a; Hooley *et al*., 2012; Hadjipanayis *et al*., 2018).

No associations were found between OHL and caregiver's last dental visit or the reason for this visit. In a prospective cohort study, which enrolled 1,000 child-caregiver dyads attending the Supplemental Nutrition Program for Women, Infants, and Children, Divaris et al. (2014) also did not find an association between OHL and access or use of dental services. Conversely, a study involving a convenience sample of 106 child-caregiver pairs attending the dental clinic at the University Of North Carolina School of Dentistry, found OHL was related to whether the child had previously visited the dentist. Care must be taken when considering these results because only a bivariate analysis of the data was performed (Miller *et al*., 2010). The results of the present study may differ from others because the participants were recruited at a dental clinic where they were already seeking a dental appointment.

This study has some positive aspects that deserve to be highlighted such as the sample calculation and the process of training and calibrating the examiners both to use BREALD-30, a reliable and validated measure of OHL (Junkes *et al*., 2015) and the DMFT/dmft index, so reducing the measurement error. However, there are some limitations. The external validity of the data is applicable only for populations with similar socioeconomic and demographic characteristics to those from the present study, attending a dental appointment for their children. In addition, these cross-sectional data do not allow establishment of a cause and effect relationship between OHL and the independent variables. Prospective well-designed studies are necessary to investigate the relationship between OHL and oral health outcomes and if strategies created to improve OHL levels are effective in the population.

These results may demonstrate that caregivers need help in clarifying their knowledge and perceptions of the oral status of their children. It is of great importance for oral health professionals to know how to measure OHL, its impact on oral health outcomes and, based on that knowledge, to create strategies to improve OHL in ways that will positively impact the patient/professional relationship. Strategies such as the development of better communication skills, focusing especially on the importance of the prevention of oral disease and working outside the dental setting (schools and community associations) to ensure better access to information related to oral health, may improve OHL and population oral health outcomes.

Conclusion

Caregivers' OHL was associated with the level of education and their perception of their child's oral health when controlled by the time since their last dental visit, monthly family income, and the child's clinical dental status. OHL was unrelated to monthly family income, child dental status, caregivers' perceived oral health or child or caregiver's oral health behaviors.

Acknowledgments

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