Impact of a Government Income Support Program on the OHRQoL and orthodontic treatment need. A case-control study

Impacto de um Programa de Apoio à Renda do Governo na OHRQoL e na necessidade de tratamento ortodôntico. Um estudo de caso-controle

Impacto del Programa de Apoyo a los Ingresos del Gobierno en la OHRQoL y la necesidad de tratamiento de ortodoncia. Un estudio de casos y controles

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Abstract
This study aimed to assess the impact of a Government Income Support Program in orthodontic treatment need and on adolescents' oral health-related quality of life (OHRQoL). A population-based, matched case-control study involving 309 adolescents aged 11-14 years was conducted in the northeast of Brazil (Bahia, Brazil). The case group (with impact on OHRQoL) and the control group (no impact on OHRQoL) were matched by age and sex (p>0.05) at a ratio of 2: 1 (206 controls: 103 cases). Impact on the adolescent's OHRQoL was assessed using the Brazilian version of the Child Perceptions Questionnaire (CPQ11-14). Families who received Bolsa Família determined their participation in Government's Income Support Program. The Dental Health Component of the Index of Orthodontic Treatment Need (IOTN-DHC) determined the orthodontic treatment need. The data were analyzed using conditional logistic regression (p≤0.05; 90%CI). The results showed that 96.1% of adolescents in the case group and 89.3% of adolescents in the control group present orthodontic treatment need. Adolescents with a negative impact on OHRQoL are 2.75 (90%CI: 1.12-6.72) times more likely to present orthodontic treatment need than the control group. The exposure factor to Government Income Support Program did not affect the adolescent's OHRQoL. However, adolescents reported a negative impact of orthodontic treatment need in their OHRQoL.
Keywords: Quality of life; Treatment need; Orthodontic; Socioeconomic status.

Resumo
O objetivo deste estudo foi avaliar o impacto de um Programa de Apoio à Renda do Governo na necessidade de tratamento ortodôntico e na qualidade de vida relacionada à saúde bucal (QVRSB) de adolescentes. Um estudo de caso-controle pareado de base populacional envolvendo 309 adolescentes de 11 a 14 anos foi realizado no Nordeste do Brasil (Bahia, Brasil). O grupo de caso (com impacto em QVRSB) e o grupo de controle (sem impacto em QVRSB) foram pareados por idade e sexo (p> 0,05) em uma proporção de 2: 1 (206 controles: 103 casos). O impacto no QVRSB do adolescente foi avaliado por meio da versão brasileira do Child Perceptions Questionnaire (CPQ11-14). As famílias que receberam o Bolsa Família determinaram sua participação no Programa de Apoio à Renda do Governo. O Componente de Saúde Bucal do Índice de Necessidade de Tratamento Ortodôntico (IOTN-DHC) determinou a necessidade de tratamento ortodôntico. Os dados foram analisados por regressão logística condicional (p≤0,05; IC 90%). Os resultados mostraram que 96,1% dos adolescentes do grupo caso e 89,3% dos adolescentes do

grupo controle apresentam necessidade de tratamento ortodôntico. Adolescentes com impacto negativo na OHRQoL têm 2,75 (IC 90%: 1,12-6,72) vezes mais chance de apresentar necessidade de tratamento ortodôntico do que o grupo controle. O fator de exposição ao Programa de Apoio à Renda do Governo não afetou a QVRSB do adolescente. No entanto, os adolescentes relataram um impacto negativo da necessidade de tratamento ortodôntico em sua QVRSB.

Palavras-chave: Qualidade de vida; Necessidade de tratamento; Ortodontia; Status socioeconômico.

Resumen

Este estudio tuvo como objetivo evaluar el impacto de un Programa de Apoyo a los Ingresos del Gobierno en la necesidad de tratamiento de ortodoncia y en la calidad de vida relacionada con la salud bucal de los adolescentes (CVRSB). En el noreste de Brasil (Bahía, Brasil) se llevó a cabo un estudio de casos y controles emparejado basado en la población que incluyó a 309 adolescentes de 11 a 14 años. El grupo de casos (con impacto en CVRSB) y el grupo de control (sin impacto en CVRSB) se emparejaron por edad y sexo (p> 0,05) en una proporción de 2: 1 (206 controles: 103 casos). El impacto en la CVRSB del adolescente se evaluó mediante la versión brasileña del Cuestionario de Percepciones del Niño (CPQ11-14). Las familias que recibieron Bolsa Família determinaron su participación en el Programa de Apoyo a los Ingresos del Gobierno. El componente de salud dental del índice de necesidad de tratamiento de ortodoncia (IOTN-DHC) determinó la necesidad de tratamiento de ortodoncia. Los datos se analizaron mediante regresión logística condicional (p≤0,05; IC del 90%). Los resultados mostraron que el 96,1% de los adolescentes del grupo de casos y el 89,3% de los adolescentes del grupo de control presentan necesidad de tratamiento de ortodoncia. Los adolescentes con un impacto negativo en la CVRSB tienen 2,75 (IC del 90%: 1,12-6,72) veces más probabilidades de presentar necesidad de tratamiento de ortodoncia que el grupo de control. El factor de exposición al Programa de Apoyo a los Ingresos del Gobierno no afectó a la CVRSB del adolescente. Sin embargo, los adolescentes informaron un impacto negativo de la necesidad de tratamiento de ortodoncia en su CVRSB.

Palabras clave: Calidad de vida; Necesidad de tratamiento; Ortodoncia; Estatus socioeconómico.

1. Introduction

Currently, aiming to favor quality of life (Coelho & Melo, 2017; Ribas-Prado et al., 2016), several developing countries have used income support programs to reduce poverty and social inequality (Monnerat et al., 2007; Oliveira et al., 2011a; Roque et al., 2015; Almeida e Silva, 2016). In Brazil, such strategy is performed through social assistance programs such as the Bolsa Família (Sperandio e Priore et al., 2015), which is considered the most extensive income support program directed to families in poverty or extreme poverty conditions (Brasil, 2018).

The Bolsa Família Program presents conditionalities in the fields of education and health. Thus, it aims to ensure nutritional improvements and good health conditions and promote children and adolescents' access and maintenance in schools (Brasil, 2018). Studies have been performed to assess the impact of this Program on the quality of life, health, and nutrition of individuals, showing controversial results (Coelho & Melo, 2017; Ribas-Prado et al., 2016; Monnerat et al., 2007; Oliveira et al., 2011a; Almeida e Silva, 2016; Sperandio e Priore et al., 2015; Brasil, 2018; Oliveira et al., 2011b; Uchimura et al., 2012; Ferreira e Magalhães, 2017; Sperandio et al., 2017; Suzart e Ferreira, 2018; Carvalho et al., 2014).

Understanding the association of clinical factors (Fernandes et al., 2013; Bulgareliet al., 2018) and socioeconomic status with an individual's quality of life may contribute to assessing more vulnerable groups, guiding health programs, and providing a better cost-effectiveness relationship of oral health policies (Piovesan et al., 2010; Scapini et a., 2013). The oral health promotion strategies should include subjective, social, and environmental aspects in planning, action, and assessment (Piovesan et al., 2010).

Among oral health problems, malocclusion alters the craniofacial growth and development that may affect oral health-related quality of life (OHRQoL) (Scapini et a., 2013; Oliveira et al., 2013a; Sardenberg et al., 2013; Dawoodboy et al., 2013; Sun et al., 2018; Dalaie et al., 2018; Bauman et al., 2018). Malocclusion association with OHRQoL shows a significant influence on socioeconomic determinants and family environmental characteristics (Dimberg et al., 2015; Paula et al., 2017). In this sense, the literature presents no reports on the impact of income distribution programs on OHRQoL.

Thus, the hypothesis studied is that adolescents whose families benefit from a Government Income Support Program (Bolsa Família) have more access to services, lower orthodontic treatment need, and lower impact on OHRQoL. Therefore, this study aimed to assess the impact of a Government Income Support Program in the orthodontic treatment need and on

adolescent's OHRQoL.

2. Methodology

The Human Research Ethics Committee (#57990516.2.0000.5385) previously approved this study, performed according to the STROBE statement.

This case-control study included a population-based consisting of 309 adolescents aged between 11 and 14 years enrolled at public schools in Ilhéus, Brazil. Ilhéus is a seaside city located in Brazil's northeast region and is divided into ten administrative health districts. The average monthly income is approximately US$ 110 per capita, and the Human Development Index is 0.690.

Adolescents whose parents did not sign the Informed Consent Form, presenting previous or current orthodontic or orthopedic treatment, and who were not intellectually fit to answer the questionnaire were excluded from the study. The minimum sample size for this study was calculated based on test power of 80%, standard error of 5.0%, and estimated 63.5% and 37% prevalence rates of orthodontic treatment need in case and control groups, respectively. These characteristics were determined in a pilot study, and the individuals (n = 30) were not included in the main sample. Considering two controls for each case, the minimum sample size to satisfy the requirements was 103 cases and 206 controls (Pereira, 2018; Koche, 2011).

Training and calibration

The training and calibration exercise consisted of two phases (theoretical and clinical). The theoretical stage involved a discussion on the diagnostic criteria of malocclusion. An orthodontics specialist (gold standard) coordinated this phase, instructing the researcher on conducting the examination. The clinical phase was performed in a school selected randomly and not belonging to the main sample. The dentist examined 50 adolescents selected previously, aged between 11 and 14 years. The weighted Kappa was calculated based on the Dental Health Component of the Index of Orthodontic Treatment Need (IOTN-DHC). The inter-examiner agreement was tested by comparing the examiner with the gold standard (K = 0.92).

Collection of clinical data

The clinical examination was performed in the schools after receiving the signed Informed Consent Form. Orthodontic treatment need was defined according to the IOTN-DHC (Brook PH & Shaw, 1989). Using a scale that ranges from Grade 1 to Grade 5, the IOTN-DHC assesses need, missing teeth (including congenital absence and impacted teeth), overjet (positive or negative), posterior and anterior crossbite, crowding, overbite, and anterior and posterior open bite. Although all changes were assessed, only the most severe was used as a base to determine treatment need. For data analysis, the IOTN-DHC was dichotomized in no/little need (grades 1, 2, and 3) and with need (4 and 5) (Mandall et al., 2000).

Collection of non-clinical data

The non-clinical data were assessed by the oral health-related quality of life (OHRQoL) instrument directed to adolescents and by the questionnaire on sociodemographic data answered by the parents and/or guardians.

The sociodemographic variable analyzed was the participation in Government Income Support Program named Bolsa Família, directed to families in poverty and extreme poverty conditions in Brazil. The families benefited receive an income benefit, which is transferred directly from the Brazilian Federal Government. The amount received corresponds to the sum of types of benefits predicted in the Bolsa Família Program, which depends on the composition (number of people, ages, presence of pregnant women, etc.) and the family's income. For data analysis, the adolescent's family receiving at least one benefit, regardless of the amount, was considered a participant of the income distribution program.

The short and Brazilian version of the Child Perceptions Questionnaire (CPQ11-14) assessed the impact of oral health-related quality of life (OHRQoL) of adolescents (Jokovic et al., 2002; Jokovic et al., 2006; Barbosa et al., 2009). CPQ11-14 includes 16 multiple choice questions referring to the period of three months before the assessment and it is divided into four domains: oral symptoms, functional limitations, emotional well-being, and social well-being. The total score of the CPQ11-14 is obtained by adding the response scores: 0 = never, 1 = rarely, 2 = sometimes, 3 = frequently, and 4 = always. Scores ≥25 set a negative impact on OHRQoL and scores <25 set the absence of impact on OHRQoL (Barbosa et al., 2009; Torres et al., 2009).

The outcome variable of "impact on the OHRQoL of adolescents" was used to define cases and controls. Thus, 103 (33.3%) adolescents with impact of OHRQoL were eligible for the case group and 206 (66.7%) adolescents without impact on OHRQoL were eligible for the control group. Cases and controls were matched by age and sex at a 2:1 ratio.

Data analysis

Frequency distributions were used to characterize the sample and demonstrate the distribution of the CPQ11-14 item levels. Case and control groups were matched for the variables age and sex, selecting two adolescents of the control group for each case randomly and maintaining the ratio of 1: 2 (103 cases: 206 controls). The chi-square test analyzed the pairing between case and control groups for the variable of sex, and Student's t-test analyzed it for the variable of age.

Case and control groups were analyzed for orthodontic treatment need (with or without need) and participation in an income distribution program (yes or no), using conditional logistic regression models and estimating odds ratio with the 90% confidence interval. All analyses were performed in the R software (R Foundation for Statistical Computing, Vienna, Austria).

3. Results

Table 1 showed no significant difference between case and control groups regarding sex and age of the adolescents (p>0.05).

Table 2 presents the association among participation in income distribution programs, orthodontic treatment need, and impact on OHRQoL. There was no significant difference between case and control groups regarding the income distribution program (p>0.05). Thus, the exposure factor of the income distribution program did not affect the adolescent's OHRQoL. Adolescents of the case group are 2.75 (90%CI: 1.12-6.72) times more likely to present orthodontic treatment need than the control group. Thus, the orthodontic treatment need factor affected OHRQoL.

Table 1. Baseline sample in groups with and without impact on OHRQoL.

Variable	Category	Group		p-value
		*Case (with OHRQoL impact)	Control (no OHRQoL impact)	
		n (%)	n (%)	
Sex	Female	63 (61.2%)	126 (61.2%)	1.000
	Male	40 (38.8%)	80 (38.8%)	
		Mean (standard deviation)	Mean (standard deviation)	
Age (years)		12.6 (1.1)	12.4 (1.0)	0.1254

*Case group: negative impact on OHRQoL (CPQ≥25). Source: Authors.

Table 2. Association of orthodontic treatment need, Bolsa Família, and the negative impact of oral symptoms on quality of life.

Exposure factor	Category	Groups (negative impact on OHRQoL)	
		Case (with impact)	Control (no impact)
		n (%)	n (%)
Income distribution Program "Bolsa Família"	No	65 (63.1%)	134 (65.0%)
	&Yes	38 (36.9%)	72 (35.0%)
	$OR (#CI)	1.09 (90%CI: 0.72-1.66)	
	p-value	0.7335	
Orthodontic treatment need	No	4 (3.9%)	22 (10.7%)
	&Yes	99 (96.1%)	184 (89.3%)
	$OR (#CI)	2.75 (90%CI: 1.12-6.72)	
	p-value	0.0627	

$Odds ratio; #Confidence interval; &Reference level; *Case group: negative impact on OHRQoL (CPQ≥25). Source: Authors.

4. Discussion

Quality of life-related to oral health (OHRQoL) is affected by different factors, which may be clinical and represented by oral diseases or socioeconomic determinants, such as financial conditions; therefore, it is essential to understand such association (Bulgareliet al., 2018; Dimberg et al., 2015; Paula et al., 2017). The importance of our study lies in the fact that it is the first case-control study to investigate the impact of the Brazilian Government Income Support Program associated with orthodontic treatment need on adolescent's OHRQoL.

The main finding of the present study was that exposure to Government Income Support Program did not affect the OHRQoL of adolescents. Such results reject our hypothesis and show the impact of orthodontic treatment need on the adolescent's OHRQoL and corroborate the previous literature (Fernandes et al., 2013; Piovesan et al., 2010; Scapini et a., 2013; Sardenberg et al., 2013; Dawoodboy et al., 2013; Sun et al., 2018; Dalaie et al., 2018; Paula et al., 2017; Kavaliauskienè et al., 2018; Vedovello et al., 2016), which shows an association between clinical aspects and OHRQoL.

A potential explanation for these findings is that adolescents receiving the benefit and presenting malocclusion do not have access to orthodontic treatment, negatively affecting their daily lives. Previous studies (Teixeira et al., 2018; Oliveira et al. 2013b) show the presence of inequities in dental care, considering that young people with low economic conditions (public school, unemployment, participants of Bolsa Familia Program) useless dental care, although they have more significant needs.

As for socioeconomic aspects, the results presented in the literature are still controversial, considering some studies confirm the influence on OHRQoL (Piovesan et al., 2010; Scapini et a., 2013; Sardenberg et al., 2013; Locker, 2007; Apaza-Ramos et al., 2015), and others deny it (Sun et al., 2018; Kavaliauskienè et al., 2018; Firmino et al., 2016). To assess the socioeconomic context, in the present study, the Government Income Support Program-Bolsa Familia initiated in 2003 was considered an exposure factor (Brasil, 2018). Thus, the participation in the program did not result in improved access to orthodontic treatment for the population studied, which may justify our findings—the literature suggests (Oliveira et al. 2013b) incorporating oral health care in the conditionalities of the Bolsa Familia Program to decrease inequities.

Studies have been performed to assess the impact of this program on the quality of life, health, and nutrition of

individuals. The results are still questionable, considering some studies showed nutritional improvement (Coelho e Melo, 2017; Oliveira et al., 2011b; Sperandio et al., 2017) which was not satisfactory in others (Sperandio e Priore et al., 2015; Ferreira e Magalhães, 2017; Suzart e Ferreira, 2018). However, it is unanimous that offering the benefit to the families is insufficient, and emphasizing nutritional and health education is required. Moreover, studies indicate that the conditionalities of the program bring users closer to health services (Monnerat et al., 2007; Oliveira et al., 2011a; Almeida e Silva, 2016; Suzart e Ferreira, 2018; Carvalho et al., 2014) providing countries with significant advances in this sector (Roque et al., 2015). Regarding psychological health and quality of life, the findings remain controversial (Ribas-Prado et al., 2016; Almeida e Silva, 2016). However, even with the program's limitations, as it is often considered the only family income, it has reflected positively in the lives of families in poverty conditions.

The limitation of this study is related to the retrospective nature of the case-control design. A longitudinal study is suggested to assess the impact of the income distribution program on OHRQoL over time. Finally, our findings are highlighted for contributing to understanding the factors affecting the OHRQoL of adolescents. Thus, a future hypothesis to be investigated is access to the health services of the families participating in the program.

5. Conclusion

The Government Income Support Program (Bolsa Família) did not affect the adolescent's OHRQoL. However, adolescents reported a negative impact of the need for orthodontic treatment on their OHRQoL. Thus, it is suggested that the socioeconomic and clinical factors, that are related to OHRQoL, be comprehensively evaluated and considering the individual's context.

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