

PROMOTION OF ORAL HEALTH IN SCHOOLCHILDREN IN THE FRAMEWORK OF A COMPREHENSIVE COLLECTIVE INTERVENTION, CONDUCTED IN THE PERIOD 2013-2015, IN CÓRDOBA, ARGENTINA.

Promoción de salud bucal de escolares en el marco de una intervención integral colectiva, desarrollada en el periodo 2013-2015, en Córdoba, Argentina.

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ABSTRACT:

Objective: Oral health is a public health challenge that must be addressed by integrating its social and biological dimensions to adopt a dental practice with a sense of integrality that takes into account the needs and potentialities of each person and context. The objective of this study was to analyze the oral health status of schoolchildren in a socio-environmentally vulnerable urban area of the city of Córdoba, Argentina, within the framework of a comprehensive collective intervention, conducted in the period 2013-2015 at the María del Tránsito Cabanillas school.

Material and Methods: The intervention was organized in 3 stages: diagnosis, collective design and implementation of oral health promotion strategies, and evaluation, applying qualitative and quantitative logics appropriate to the object of study. Diagnosis was carried out in 2013, performing a clinical-dental examination of schoolchildren aged 6 to 8 years and a participatory study of the school environment.

Results: Based on the diagnostic data, the stage of collective design and implementation of promotion strategies and oral health care was carried out. The evaluation of the intervention was performed through the clinical-dental examination of schoolchildren aged 10 to 12 years who attended the school in 2015, and who, also having attended the same institution in 2013, participated in the diagnostic study and analysis of the qualitative records related to the intervention. Healthy clinical trends and positive assessments by the different actors were observed.

Conclusion: The results encourage continuing conducting comprehensive intervention strategies for oral health promotion and care.

KEYWORDS:

oral health; public health; health promotion; delivery of health care; schools; child.

RESUMEN:

Objetivo: La salud bucal constituye un desafío de la salud pública que demanda ser abordado integrando su dimensión social y biológica, para desarrollar una práctica odontológica con sentido de integralidad que respete las necesidades y potencialidades del contexto. El objetivo de este estudio es analizar la salud bucal de escolares de un área urbana socio-ambientalmente vulnerabilizada de la ciudad de Córdoba, Argentina, en el marco de una intervención integral colectiva, desarrollada durante el periodo 2013-2015 en la escuela María del Tránsito Cabanillas.

Material y Métodos: La intervención se desarrolló en 3 etapas: diagnóstico, diseño colectivo e implementación de estrategias de promoción de salud bucal y evaluación, aplicando lógicas cualitativa y cuantitativa según correspondiera al objeto de estudio. En el año 2013 se llevó a cabo el diagnóstico realizándose examen clínico-odontológico a los escolares de 6 a 8 años y estudio participativo del entorno escolar.

Resultados: A partir de los datos diagnósticos se realizó la etapa de Diseño colectivo e implementación de estrategias de promoción y atención de salud bucal. La evaluación de la intervención se realizó a través del examen clínico-odontológico a los escolares de 10 a 12 años asistentes a la institución escolar en el año 2015, que habiendo asistido en el año 2013 a la misma institución participaron del estudio diagnóstico y del análisis de los registros cualitativos relativos a la intervención desarrollada. Se observaron tendencias clínicas saludables y valoraciones positivas por parte de los diferentes actores.

Conclusion: Los resultados estimulan a continuar desarrollando estrategias de intervención integrales de promoción y atención de salud bucal.

PALABRAS CLAVE:

salud bucal; salud pública; promoción de la salud; prestación de atención de salud; instituciones académicas; niño.

INTRODUCTION.

Oral health status is key to the well-being of people. Hence, it should be addressed by integrating social and biological dimensions for the adoption of dental practices that embrace a sense of integrality. The strong association between multiple sociocultural factors that determine the health-illness-care process¹ is widely recognized, with the frequency and distribution of pathologies varying according to the context in which the subjects develop.²

The Argentinian population has high indicators of oral pathologies, lack of healthy habits and absence of public policies that can modify their oral health conditions.³ The distribution of caries in 12-year-old schoolchildren and its relationship with social variables shows inequalities.⁴

Despite the efforts made by international organizations, countries, and communities to facilitate access to care, expand coverage, and improve

the care process, the prevalence of this disease remains high.⁵ The traditional approach to oral health, oriented mainly towards treatment, is now increasingly directed towards prevention and health promotion thanks to the availability of new concepts and technologies.⁶

For its part, the FDI⁷ recognizes the multifaceted nature and attributes of oral health and considers the complex interactions that occur between genetic and biological factors, social environment, physical environment, health behaviors, and access to care with how people rate their oral health including but not limited to age, culture, income, and experience. In relation to the latter, knowledge, attitudes, and practices of the parents are a field of intervention with potential impact on the oral component of the health of schoolchildren. In this context, the school becomes a space with great potential for health promotion.⁸

On the other hand, certain necessary habits

in the physical/emotional development of girls and boys, depending on the circumstances, can become harmful. The prevalence of dysfunctional oral habits reported by different authors in Latin American and Caribbean countries exceeds 50%.⁹

On its part, the perspective of collective health comprises a complex set of technical, scientific, cultural, ideological, political, and economic knowledge and practices related to health, involving organizations interested in defending health as a right.¹⁰

The latter requires the articulation of interdisciplinary and intersectoral work, (in the fusion of university, government, community), focused on actions of promotion and education of the population in general and of the teams in particular.¹¹ The context becomes the key to understanding and transforming the environment that is enriched with the consideration of social, economic, political, cultural, and environmental dimensions that contribute to the well-being of people.

This raises the relevance of carrying out comprehensive interventions in the educational context implementing health practices, with common objectives and tasks, in which health agents/professionals have the purpose of co-managing or collaborating with the population to favor the development of their capacities and potentialities around processes that make it possible to identify vulnerabilities and possibilities of social groups. This could help to reduce the deteriorating processes and/or strengthen the protective ones.¹²

Health professionals/agents as well as the participating population learn reciprocally, recognizing the knowledge that they have regarding health, its conditioning factors, and the origin and reproduction of the practices. The capacities of the population are strengthened from a triple perspective: enabling social participation, preventing the appearance of risk situations, and addressing emerging needs.

In 2013, a collective and comprehensive intervention focused on oral health was implemented at the María del Tránsito Cabanillas public primary school (B° El Quebracho), located at the SE of

Córdoba, Argentina, a socio-environmentally vulnerable area.¹³

An interdisciplinary research team made up of dentists, psychologists, educators, biologists, dental students, schoolchildren aged 6 to 12, relatives in charge of the schoolchildren, teachers, and other school personnel participated in the intervention.

Pre-school and primary schools in Argentina are spaces where children grow, learn, and share their daily lives, open to experiences. The university would act as a catalyst, promoter, and facilitator of the integration process between the educational institution and the community.

In this context, the objective was to analyze the oral health status of schoolchildren from a socio-environmentally vulnerable urban area in the city of Córdoba, Argentina, under a comprehensive collective intervention, conducted during the period 2013-2015 at the María del Tránsito Cabanillas school.

MATERIALS AND METHODS.

A study including an intervention was carried out in the María del Tránsito Cabanillas school community, in the city of Córdoba, using a mixed design that included quantitative and qualitative strategies according to the object of study. The research was organized in three stages: diagnosis, collective design and implementation of promotion strategies and oral health care, and evaluation. The study protocol was approved by the Secretary of University Policies of the Ministry of the Argentine Nation (Resol.SPU No. 029/11).

The regulations of the Council for International Organizations of Medical Sciences (CIOMS)¹⁴ were followed. All participants presented the informed consent signed by the parents and gave their authorization to participate in the study.

Diagnostic stage

The oral health status of girls and boys aged 6 to 8 years (N=45) who attended primary school during the 2013 school year was analyzed. The clinical examination was carried out in the multipurpose room of the educational institution, with simplified

technology, with natural light, using the visual method for caries diagnosis according to the criteria proposed by the WHO¹⁵ for epidemiological studies. Previously, the 4 clinical examiners were calibrated with intra-examiner kappa=0.85; inter-examiner=0.80.

The following oral health indicators were registered: presence of caries, fillings, extractions, white spot,¹⁵ in temporary dentition (mbt) and in permanent dentition (MBp); biofilm (visible to clinical observation), and gingival alteration (spontaneous bleeding and inflammation), occlusal relationships and their risk conditions, dysfunctional habits,¹⁶ and status of the temporomandibular joint.

DMFT and deft¹⁷ were calculated. The variables were constructed: Total Caries Experience (TCE) (deft+DMFT+mbt+MBp) and No caries experience (deft=0; DMFT=0;mbt=0;MBp=0).

Relative frequencies, measures of centralization and dispersion of the data were calculated using the Infostat 2012 program.

The same research team^{8,18-20} complemented the clinical-dental diagnosis, analyzing the recognition of essential elements of the social capital of the parents of the schoolchildren, the profile of food consumption during the school day, and the serotypic variability of *Streptococcus mutans* in schoolchildren.

All diagnostic studies became in-puts for the collective design of health promotion strategies.

Stage of collective design and implementation of strategies

Workshops were used for the design of health promotion strategies, considering that, "*including the voice of the other*" is the most appropriate strategy to generate respectful work modalities of the logics of production, circulation, and appropriation of knowledge that every learning process involves.²⁰

Coordinated by the research team, instructional workshops were carried out, complemented with workshops for families and schoolchildren (Table 1), and activities in the classroom space (Table 2). Clinical-dental care was provided using a preventive and comprehensive approach in the multipurpose room of the school, teaching oral health care and

hygiene; the importance of drinking water was also reinforced, systematic remineralization therapy was carried out through supervised brushing with 2% sodium fluoride gel pH=6.8 (Neutrodent®), selective grinding of unbalanced dental surfaces, in children with caries without pulp involvement, atraumatic restorative treatment (ART)²¹ was performed, using 2% sodium fluoride pH=6.8 (Neutrodent®) as a remineralizing agent. For the resolution of more complex problems, which could not be resolved at the first level of care, patients were referred to public services.

Evaluation stage

To evaluate the intervention strategy, the oral health status of children aged 10 to 12 years (N=43), who attended school in 2015, was analyzed in relation to children aged 6 to 8 years (N=45), who had attended the same institution in 2013 and participated in the diagnostic study.

The cause of dropout from the study consisted of not attending the educational institution due to the change of residence of the student's family. The clinical-dental examination was performed under the same conditions described for the diagnostic stage. Relative frequencies, measures of centralization and dispersion of the data were calculated. For the comparison of oral health in the two moments of study, percentage changes, and differences in means and proportions were estimated. In all cases, the level of significance considered was $p < 0.05$.

Food consumption during school breaks was observed. A photographic record of the food offered at the school kiosk was also maintained, as well as interviews with 20 children, 12 relatives, all teachers and school staff about dietary guidelines, and analysis of documents (school notebooks and teaching plans). With the data obtained, the category system was established.²⁰

RESULTS.

In 2015, an increase of 55.2% in caries-free children was observed (Table 3); Significant decrease in total caries experience (TCE) (5.08 ± 3.62

to 3.17±4.55); Increased DMFT (0.28±0.62 to 1.95±4.10), together with component D (0.26±0.61 to 1.57±0.90) and F (0.02±0.14 to 0.31±1.56); Significant decrease in deft (4.31±3.27 to 0.97± 3.05) and its components (Table 4).

A percentage decrease of 37.86% and 38.04% in biofilm and gingival alteration, respectively, was observed (Table 3); Percentage increase in malocclusion (31.57%) and decrease in risk conditions, (Table 3).

In relation to the TMJ, the presence of some symptoms of alteration increased significantly (Table 3). Within the registered conditions of risk of malocclusion, (Table 5), dysfunctional breathing increased significantly while premature tooth loss and dental interference decreased significantly.

The following categories emerged from the qualitative analysis for the different actors as positive indicators of the intervention strategy:

Teachers

They expressed satisfaction of having taught health content in an integrated manner in the classroom, incorporating parents and teachers of special subjects in institutional projects for the classroom, considering the needs of the children.

Schoolchildren

They report satisfaction with their participation in the science fair, in the preparation of healthy foods, and in activities in the classroom. They recognize healthy habits and self-care practices and can explain protective and risk factors for health in the context in which they live and interact.

Parents

They report satisfaction with their participation in "healthy food preparation workshops"; reaching agreements with teachers for the preparation of healthy snacks to be offered at school; and in encouraging children to prefer healthy foods (cereals) in the school kiosk.

Table 1. Description of content and achievements of the workshops held with families and teachers during the 2013-2015 period.

PERIOD	WORKSHOP CONTENT	ACHIEVEMENTS
2013- 2014	Presentation and collective analysis of the diagnosis of oral health.	Recognition of the oral health status, including risk indicators and protective factors.
	Presentation and discussion of health promotion strategies.	Teaching proposal: water, essential for human health.
	Propose and operationalize proposals for health promotion strategies.	Science fair organized by the school and the students for the community. Focus the Science Fair on the importance of handwashing, water purification, and water pollution.
2014- 2015	Establish work strategies.	Preparation of healthy snack and activities for the classroom
	Preparation of healthy food for teachers, parents, and children	Production and dissemination of brochures with cooking recipes, distributed among those attending the workshop. Preparation and tasting of sweet foods (cereal cookies with fruit/banana bread/cereal bar and nuts) and savory (whole wheat hamburgers/whole rice/lentils/chickpeas, vegetable stew using the nituke method).
	Coordination and accompaniment of first-level teachers and school personnel for the preparation of a healthy snack.	Teachers make flans and distribute them among the students.

Table 2. Educational activities in classroom space for students during the period 2014-2015.

SPECIFIC CONTENT	ACTIVITY
Healthy and unhealthy habits	Training around healthy and unhealthy habits, self-care, and the presence of the neighborhood health center. Teaching oral hygiene technique. Assembly of the "toothbrush holder" by classroom.
Healthy snack	Different options are addressed that the schoolchildren can have as a snack. For example, for Monday it is suggested to bring a piece of fruit from home, for Tuesday the teachers and school staff prepare flan/dairy products and deliver cereal to the schoolchildren, on Wednesdays, on Thursday they share "pororó" (popcorn) made by the teachers and on Fridays "healthy snack" without specific instructions.
Risk conditions and oral health protection in everyday life	Using the game "Putting Barriers to Disease" as a tool, the recognition of risk conditions and protection of oral health in daily life and the decision to protect the person from external agents were worked on. The schoolchildren explained what they consider protective factors and which risk factors for health they can find in their daily lives.
Care, self-care and collective care	Conversations and counseling carried out during class hours.

Table 3. Oral health status of the schoolchildren under intervention.

	SCHOOLCHILDREN OF 6 TO 8 YEARS OF AGE 2013 (N= 45)	SCHOOLCHILDREN 10 TO 12 YEARS OF AGE 2015 (N= 43)	PERCENTAGE DIFFERENCE	Z ⁺
Free of caries lesion	6.66 %	14.89* %	+55.27	1.66*
With caries lesion	93.34 %	85.11* %	- 8.81	1.16*
Visible biofilm	84.44 %	57.44 %	-37.86	2.88
Gingival alteration	37.77 %	23.40* %	-38.04	1.55*
Malocclusion	42.22 %	61.70 %	+31.57	-2.22
Some risk of malocclusion	51.11 %	45.94 %	-10.11%	4.88
Any symptom of TMJ	8.88 %	13.91* %	+24.90	0.96*

±: Statistical of difference of proportions test. *: Significant value for $p < 0.05$.

Table 4. Caries situation of schoolchildren under intervention.

INDICATOR	SCHOOLCHILDREN OF 6 TO 8 YEARS OF AGE 2013 (N= 45)		SCHOOLCHILDREN OF 10 TO 12 YEARS OF AGE 2015 (N= 43)	
	MEAN ± SD	MEDIAN	MEAN ± DS	MEDIAN
D	0.26 ± 0.61	0	1.57 ± 3.90*	1
M	0 ± 0	0	0.06 ± 0.49	0
F	0.02 ± 0.14	0	0.31 ± 1.56*	0
DMFT	0.28 ± 0.62	0	1.95 ± 4.10*	2
d	3.64 ± 2.94	3	0.53 ± 2.27*	0
e	0.4 ± 0.81	0	0.23 ± 1.33*	0
f	0.26 ± 0.83	0	0.19 ± 1.22	0
deft	4.31 ± 3.27	4	0.97 ± 3.05*	3
mb temporary	0.22 ± 0.63	0	0	0
MB permanent	0.26 ± 0.78	0	0.23 ± 1.39	0
TCE#	5.08 ± 3.62	5	3.17 ± 4.55*	3

TCE#: DMFT+deft+temporary MB+permanent MB (indicator elaborated by the research team).

Table 5. Conditions of malocclusion risk.

		SCHOOLCHILDREN OF 6 TO 8 YEARS OF AGE 2013 (N= 45)	SCHOOLCHILDREN OF 10 TO 12 YEARS OF AGE 2015 (N= 43)	PERCENTAGE DIFFERENCE %	Z+
Conditions of malocclusion risk	Dysfunctional breathing	11.11 %	21.27 %	91.44	-1.28*
	Dysfunctional swallowing	20.00 %	44.68 %	123.4	-2.66
	Some other dysfunctional habit	28.88 %	51.06 %	76.80	-2.55
	Premature tooth loss	24.44 %	19.14 %	21.68	0.75*
	Dental interference	31.11 %	19.14 %	38.47	1.62*

+: Statistical of difference between proportions.*:significant value for $p < 0.05$.

DISCUSSION.

Findings related to the control of schoolchildren two years after the start of the intervention show a higher proportion of schoolchildren without caries; lower proportion with visible biofilm, gingival alteration, and risk of malocclusion.

Likewise, the TCE was lower two years after the start of the intervention. The data collected allow researchers to frame the caries profile of

schoolchildren aged 10 to 12 years in the study (DMFT 1.95±4.10) in the category of DMFT in consolidation (DMFT<3 with national fluoridation programs), as well as that observed in the province of Buenos Aires, Argentina.⁴

In Peruvian studies, a caries prevalence of 91.82% with DMFT= 4.08, def-t=5.81 was observed in children aged 6 to 12 years.²³ In this study, the prevalence in children aged 10 to 12 years

undergoing intervention was lower (85.11%). In a multicenter study conducted in schoolchildren from Córdoba, Argentina, and Belo Horizonte, Brazil,²⁴ the proportion of children free of caries (deft and DMFT = 0) in Brazil was 45.7%, and 19.9% in Argentina, similar to the figure achieved with the intervention.

Although in both countries, the D/d component was the most frequent in both dentitions, it is worth highlighting the greater prevalence of the F component (filled) in permanent dentition in 12-year-old children undergoing intervention. Cruz Martinez *et al.*,²³ evaluated a community intervention in schoolchildren, which included fluoride rinsing, brushing technique, dental plaque detection, dental floss technique, and instructional lessons.

They found a DMFT index=1.34 after the intervention, a somewhat lower value (1.95) was observed in this study at the end of the intervention. Regarding the Gingival Index of the same study,²⁵ they reported 92.4% of healthy schoolchildren in the school under intervention and 70.68% for the school without intervention. In the present study, although it started from a lower percentage of children with gingival health at 6 years of age (62.23%), it rose to 76.6% in children 12 years of age after the intervention.

Among the different Latin American studies on the application of programs and strategies for oral health care, Jaime *et al.*,²⁶ in a case/control study concluded that the oral health education program was not efficient in reducing the incidence of caries.

On the other hand, review studies carried out in Europe²⁷ concluded that interventions are efficient in preventing caries, but not in terms of plaque results and the acquisition of knowledge about health, and that more research is needed to evaluate interventions to prevent caries and, consequently, change behaviors related to oral health in children and their parents. In the present study, the decrease in biofilm and gingival alteration observed at 12 years of age can be attributed to concepts of oral hygiene and healthy eating worked

on with the schoolchildren during the intervention.

The prevalence of malocclusions detected in 12-year-old schoolchildren, 61.70%, was similar to that reported by other authors.²⁸ However, the increased prevalence of dysfunctional breathing as a risk condition for malocclusion observed at 12 years is of concern. This could be attributed to the effect of age together with insufficient work done in this regard, lack of access to medical care, and its strong psycho-socio cultural association. TMJ disorders are a very frequent problem, the general population shows at least one clinical sign of this dysfunction.²⁹ In the present study, the prevalence of signs or symptoms of TMJ dysfunction does not exceed 13%.

The increase in DMFT and the decrease in deft would be related to the change in dentition. However, the values of the filled components (F/f), show the clinical dental care in the framework of the intervention, in which ART was performed.

The decrease in the frequency of the presence of biofilm and gingival alteration and the increase in the number of children without caries could be attributed to the development of the educational dimension of the intervention worked on in classroom activities.

It is believed that from the intervention it was possible to adopt a reflective and participatory attitude about oral health and nutrition problems aimed at improving the quality of life of the participants. It allowed collective resignifications around health promotion and participation. It helped to overcome the individual model in the resolution of problems towards a collective model and facilitated the construction of significant and comprehensive learning in schoolchildren.

The difficulty posed by this type of comprehensive intervention in everyday spaces of health practices is to identify vulnerabilities and possibilities of social groups with the aim of co-managing objectives and common tasks, which may favor the development of their capacities and potentialities to reduce the deteriorating processes and strengthen the protective ones.

CONCLUSION.

Variations of the oral health indicators found in the children participating in the study would be related to their life cycle and the topics addressed in the intervention. The positive trends for health promotion observed in relation to the oral health status of schoolchildren and in the assessment of the intervention, by schoolchildren, parents, and the staff of the educational institution, allow researchers to consider the intervention as positive.

Likewise, it serves as a motivation to continue implementing the comprehensive intervention strategies for the promotion of oral health care that began in 2013 and include them in the educational and health practices at the same educational institution.

This intervention, as the dynamic process it is, will be periodically renovated and evaluated in relation to the needs that arise and that will be addressed taking into account the potentialities and possibilities of the target group.

Conflict of interests:

All the authors declare not presenting any conflict of interest.

Ethics approval:

This is an unpublished and original work resulting from the implementation and evaluation of an intervention proposal for vulnerable school institutions, carried out within the framework of the research project "Contextualized promotion of health in vulnerable communities". It had the ethical and methodological approval of the Program for the Association of Joint Research Projects of MERCOSUR, of the Secretariat for University Policies (SPU) - Ministry of Education (Resol.020/11) Period 2011-2015.

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Authors' contributions:

All the authors have participated in the field work, the analysis and discussion of the results and the writing, review and approval of the final version of the work. Additionally, the study was designed by Cornejo LS and Hilas E.

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