

Original Research Article

Educative Intervention in the Oral Hygiene of People with Down Syndrome: A Quasi-Experimental Study

ABSTRACT

Aims: To determine the effect of a educative intervention on the oral hygiene of people with Down Syndrome in two special education schools in Celaya, Gto.

Study design: Quantitative, correlational, quasi-experimental study

Place and Duration of Study: The experimental group of the school of Special Education Mariana and the control group of the Center of Attention Multiple Henri Wallon in Celaya, Gto, between May 2016 and April 2017.

Methodology: We included 30 students (14 men, 16 women; age range 6-21 years) with Down Syndrome. An instrument based on Orem's theory was used to evaluate self-care abilities in oral hygiene and a National Autonomous University of Mexico format of personal control of the dentobacterial plaque. The intervention "Oral hygiene in people with Down Syndrome" was implemented. All was analyzed with Student t for paired means and Student t for independent groups, and *P-value*.

Results: Self-care skills showed a significant change after the nursing intervention ($t= 2.81$, $df= 28$ and $P = .009$), knowledge ($t= 2.54$, $df= 28$ and $P = .02$) and skills ($t= 3.25$, $df= 28$ and $P = .003$); which had no significant difference were motivations ($t= 1.22$, $df= 28$ and $P = .23$) and the percentage of dentobacterial plaque ($t= -.87$, $df= 28$ and $P = .40$).

Conclusion: It is fundamental to apply a nursing intervention to improve the oral hygiene of people with Down Syndrome favoring their capacities for self-care and preventing oral pathologies. But nurses need more training in psychoeducation to improve motivation in people.

Keywords: Down Syndrome, Oral Hygiene, Self-care, Nursing Intervention.

16 1. INTRODUCTION

17
18 Down syndrome (DS) or trisomy 21 is the most frequent genetic alteration causing
19 intellectual disability [1-3].

20
21 People with SD are at greater risk of born with birth defects and are more vulnerable to
22 certain diseases [4]. These include periodontal disease, which is common and early onset,
23 as a result of altered leukocyte function, hypotonia, dentoalveolar joint laxity, as well as a
24 lack of understanding of the importance of oral hygiene (OH) and decreased manual
25 dexterity [5].

26
27 Guanajuato México, where the research was carried out, is one of the states with the highest
28 birth rates of children with SD (5.45 per 10,000 births) [6], which are a vulnerable segment of
29 the population.

30
31 OH includes a series of actions and habits acquired by people in order to maintain or
32 achieve good oral health [7].

33
34 The dentobacterial plaque (DBP) is a set of microorganisms firmly adhered to each other
35 and to a surface, surrounded by an abiotic extracellular material of a triple origin: bacteria,
36 saliva and diet, with a yellowish-white matrix; It is involved in oral infectious processes, as it
37 is the primary agent related to caries, periodontal disease and calculus [8,9].

38
39 Research has been carried out confirming this problem, as a systematic review of
40 periodontal prevention and treatment in patients with DS found articles that support the high
41 prevalence and severity of periodontal disease in people with DS, DBP which accumulates
42 when there is an OH deficiency [8], which conclude that it is extremely important to introduce
43 patients with this syndrome early in preventive programs and periodontal therapy[10].

44
45 Another systematic review on this topic elaborated by Dieguez-Perez, et al.[11], who found
46 articles indicating that people with SD present poor oral hygiene. Studies showed that they
47 have inadequate gingival health with high indexes of oral and teeth diseases, and showing
48 that these are increasing with age and also showing a greater frequency of abnormalities in
49 tooth development and bruxism. So they concluded that children with intellectual disabilities
50 are a group that needs an early and regular dental care to prevent and limit the severity of
51 the observed pathologies.

52
53 It is extremely important to investigate the effect of a educative intervention strategy in order
54 to promote the improvement of the OH of people with DS and with this, to improve their self-
55 care capacity related to oral hygiene and thus prevent the appearance of pathologies in the
56 cavity oral.

57
58 All of the above was the basis for the development of the present research, which was
59 based on Dorothea Orem's Theory. From the Theory of Nursing Systems, the system that
60 was implemented was the Educational Support System, since what was sought was to
61 encourage the person with DS to carry out their oral hygiene in a correct and independent
62 manner and therefore comply with this part of their self-care and from self-care deficit theory
63 took self-care capacities as a basis for the comprehensive nursing intervention, which are:
64 knowledge, skills and motivations [12]. All to prevent diseases of the oral cavity, avoid
65 painful treatments for the person and costly for families; In addition the promotion of OH has
66 the goodness that it can be carried out by the person with DS without having to have serious
67 complications and the material to be used to perform the hygiene is easily accessible for the
68 population [1,3,4,6,13].

The objective was to know the effect of an educative intervention in patients with DS to increase the self-care abilities on OH.

2. METHODOLOGY

2.1 Study design

It was quantitative, quasi-experimental (from Social Sciences), comparative, longitudinal.

2.2 Place and Universe of the study

The period of time to carry out the present investigation comprised from May of 2016 to April of 2017, in two Schools of Special Education Celaya, Guanajuato, Mexico, with all students with DS registered.

2.3 Selection of participants

2.3.1 Inclusion criteria

People with **D S**, who were 6 to 30 years of age, who were registered in the Special Education Schools of Celaya, Gto, Mexico who accepted to participate in the present study and whose parents or guardians had signed informed consent.

2.3.2 Exclusion criteria

Persons with health complications that did not allow them to participate in the intervention.

2.4 Variables

2.4.1 Sociodemographics

It was measured: age in years, type of trisomy, concomitant diseases, surgery, disability, siblings, place between siblings, career.

2.4.2 Independent

Educative intervention called "Oral hygiene in people with Down syndrome" was first implemented in the experimental group for a period of 2 months, three days a week in total were 24 sessions, also included a short workshop for parents or guardians of the experimental group on the "Importance of correct oral hygiene", which was also given to the parents or guardians of the comparison group as a thank you for their participation in the research, after the end of the study; all this was carried out by the person in charge of the present investigation.

In the intervention throughout the 24 sessions were used communication techniques such as: pediatric language, distraction, speech therapy, voice control, **play therapy**, non-verbal techniques, Triple technique E (Explain-Teach-Run), imitation or modeling, desensitization and positive reinforcement. The learning activities that were used in this intervention were exposure, group discussion, interrogation, demonstration technique, role play or drill. And the didactic resources that were used were models, videos and triptychs.

The intervention was also based on the self-care capabilities of Orem's theory, which included: knowledge (approached with learning the correct brushing technique), skills (encouraged with exercises to control and improve fine-motor skills) and motivations (for this, dental brushing after meals was promoted in the morning and before bedtime, the workshop "Importance of correct oral hygiene" was applied to parents and guardians and teamwork with peers was encouraged).

2.4.3 Dependent

Self-care of oral hygiene. It is a quantitative continue variable; it is the ability of the person with Down syndrome to independently perform the brushing technique; it was measured as score (higher score better self-care capability) and it was presented as mean and standard deviation

Dentobacterial plaque. It is a quantitative continue variable; is the percentage of DBP in teeth, using the O'Leary index, which uses a telltale solution staining, which is placed on the teeth by means of a swab and observes if the teeth were painted in each of its four segments, which are the mesial, distal, vestibular and lingual, this is registered in the personal plaque control format of the UNAM to obtain the percentage of PDB, using a rule of three, multiplying the number of dental pieces with plaque per 100 among the total dental pieces of the person. It was measured as percentage; it was presented as mean and standard deviation.

2.5 Questionnaires

Two instruments were used, the first one was the Personal Control Form of Bacterial plaque of the Faculty of Dentistry of the National Autonomous University of Mexico (UNAM), which has diagrams of the teeth of both, children and adults, to obtain the O'Leary index, in which the percentage of plaque in the teeth is obtained using dental plaque developers in teeth [14]; and the second was the "Dental evaluation of dental brushing technique based on Dorothea Orem's theory", the which is an ex-profeso instrument, which had a constructo validity, consulting experts dentistry and nurses, with an inter-observer reliability of 0.70 and intra-observer of 1 (Cohen's Kappa).

2.6 Procedures

The protocol was submitted for evaluation to the Research Committee and Bioethics Committee of the University of Guanajuato, Campus Celaya-Salvatierra, Division of Health Sciences and Engineering, and its approval was obtained. After the authorization of institutions and obtaining informed consent, the pre-intervention measurement was carried out with the students who fulfilled the inclusion criteria, after which the educational intervention plan was carried out. After this the second measurement was performed.

2.7 Sample size and sampling

Assuming a mean difference of 9 points and a standard deviation of 8, the minimum sample size is 14 in each group, with 95% accuracy and 80% power (Epidat 4.1, 2014, Xunta de Galicia, PAHO and University CES).

The groups were naturally formed; only randomized to know what school was experimental group and what comparison group. It was worked with all subjects with DS because they were few.

174 2.8 Statistical analysis

175 Descriptive statistics were used for the statistical analysis of data on socio-demographic
 176 variables. The association was measured with the Chi square test, it was not possible to
 177 calculate the Risk Ratio since the quantity of the sample did not obtain the score of the level
 178 of association required for this and to test the hypothesis was calculated Student t of paired
 179 and independent means with a value of $P \leq .05$ to demonstrate the statistical
 180 significance between the results. Statistical analysis was performed with the STATA 13.0
 181 statistical program (Stata Corp. College Station, TX, USA).

182 3. RESULTS AND DISCUSSION

183 The two groups have very similar characteristics, the most relevant of which were the
 184 following: gender was the same number of men and women, as the type of trisomy is
 185 unknown in most participants of both groups, and in the two groups the type of trisomy that
 186 is found in greater proportion is the regular, as for the variable of the level of intellectual
 187 disability was found difference between the experimental group (GE) and the comparison
 188 group (CG), the GE has the same number of students with mild, moderate and severe
 189 intellectual disabilities, with GC having more subjects with moderate intellectual disability
 190 level and as the main caregiver of the study subjects in both groups the mother
 191 predominates, this with respect to the variables as can be seen in Table 1.

192 **Table 1. Distribution of categorical Sociodemographic variables by group**

Variables		Experimental group (n=15)		Comparison group (n=15)		X ²	d f	P-value
		f	%	f	%			
Gender	Female	8	53.3	8	53.3	0.00	1	1.0
	Male	7	46.67	7	46.67			
Trisomy	Unknown	7	46.67	13	86.67*	-2.62	1	.02
	Regular	6	40.00	2	13.33*	1.35	1	.01
	Mosaicism	2	13.33	0	00.00*	1.46	1	.14
Concomitant disease	No	10	66.67	13	86.67	1.68	1	.2
	Yes	5	33.3	2	13.33			
Surgery	No	9	60.00	11	73.33	0.6	1	.44
	Yes	6	40.00	4	23.67			
Disability	Mild	5	33.33	2	13.33	4.82	1	.09
	Moderate	5	33.33	11	73.33			
	Severe	5	33.33	2	13.33			
Siblings	Does not have	2	13.33	4	26.67	0.83	1	.36
	Has	13	83.67	11	73.3			
Place between siblings	Does not have	2	13.33	4	26.67	1.47	1	.69
	Greater	1	6.67	1	6.67			
	Intermediate	1	6.67	2	13.33			
	Minor	11	73.33	8	53.33			

Career	Mother	13	86.67	12	80.00	0.49	1	.62
	Father	1	6.67	1	6.67	0.00	1	1.00
	Grandparents	0	0	2	13.33	-1.46	1	.14
	Siblings	1	6.67	0	0	1.02	1	.31

* Z for two proportions

As for the numerical variables it is identified that although there is difference in the age and schooling ranges this is not significant and the groups are comparable.

Table 2. Distribution of quantitative sociodemographic variables by group

Variable		Range	Mean $\pm$ SD.	t	df	P-value
Age (years)	EG (n=15)	6 - 21	14.13 $\pm$ 5.37	1.42	28	.17
	CG (n=15)	7 - 16	12 $\pm$ 2.27			
School (years)	EG (n=15)	5 - 20	11.6 $\pm$ 5.05	1.01	28	.32
	CG (n=15)	6 - 15	10.1 $\pm$ 2.7			
Number of siblings	EG (n=15)	0 - 4	2 $\pm$ 1.2	1.05	28	.30
	CG (n=15)	0 - 5	1.5 $\pm$ 1.4			

SD Standard deviation df degree of freedom EG Experimental groups CG Comparison group

Self-care skills scores with respect to the brushing technique in the pre-intervention measurement show that the scores ranges in the two groups are fairly similar in overall score, knowledge and motivation, only in the skills and the percentage of PDB shows a statistically significant difference (Table 3).

Table 3. Distribution of self-care capacity score and percentage of dentobacterial plaque per group, prior to intervention

Variables		Range	Mean $\pm$ SD	t	df	P-value
Overall self-care score	EG (n=15)	11 - 37	28.8 $\pm$ 9.0	0.92	28	.37
	CG (n=15)	10 - 33	21 $\pm$ 7.7			
Knowledge	EG (n=15)	5 - 16	11.4 $\pm$ 3.5	0.36	28	.72
	CG (n=15)	5 - 18	10.9 $\pm$ 4.1			
Abilities	EG (n=15)	2 - 14	7.93 $\pm$ 4.06	2.45	28	.02
	CG (n=15)	1 - 11	4.73 $\pm$ 3.03			
Motivation	EG (n=15)	0 - 7	4.4 $\pm$ 2.3	- 1.00	28	.32
	CG (n=15)	1 - 7	5.3 $\pm$ 2.3			
% DBP	EG (n=15)	11 - 37	23.8 $\pm$ 9.04	-5.19	28	.00001
	CG (n=15)	11.3- 93.2	57.68 $\pm$ 23.60			

DBP Dentobacterial plaque EG Experimental group CG Comparison group SD Standard deviation df degree of freedom

In the second measurement, post-intervention, there are statistically significant differences for the overall self-care score, knowledge, abilities but not in motivation neither in percentage of DBP (Table 4).

Table 4. Distribution of self-care capacity score and percentage of dentobacterial plaque per group, post-intervention

Variables		Range	Mean $\pm$ SD	t	df	P-value
Overall self-care score	EG (n=15)	19 – 50	32.47 $\pm$ 10.13	2.81	28	.009
	CG (n=15)	11 – 38	23.13 $\pm$ 7.94			
Knowledge	EG (n=15)	9 – 23	15.07 $\pm$ 4.51	2.54	28	.02
	CG (n=15)	6 – 17	11.33 $\pm$ 3.50			
Abilities	EG (n=15)	5 – 20	11.6 $\pm$ 4.67	3.25	28	.003
	CG (n=15)	2 – 14	6.73 $\pm$ 3.45			
Motivation	EG (n=15)	3 – 7	5.8 $\pm$ 1.47	1.22	28	.23
	CG (n=15)	2 – 7	5.07 $\pm$ 1.79			
% DBP	EG (n=15)	9.2 – 100	37.53 $\pm$ 27.92	-0.87	28	.40
	CG (n=15)	11.4- 95.8	45.48 $\pm$ 22.01			

DBP Dentobacterial plaque EG Experimental group CG Comparison group SD Standar deviation df degree of freedom

Although this study included a workshop for parents in which they were trained on oral hygiene issues, their importance, why people with DS are more susceptible to oral diseases, why it is important for parents to support the use of the technique at home and were taught to perform DBP detection and the brushing technique was correctly identified that this had a minimal impact, this may be due to that in several studies has been found that by parents or caregivers, there is the idea of the lack of autonomy of the students to assume their own care [15], which may explain why the lack of family motivation to follow the intervention in the home.

In addition to this is proven that they are sometimes not supervised to carry out the brushing technique correctly and the frequency of this in people with DS is inadequate, it is usually <2 times / day; these factors lead directly to high rates of DBP which, according to studies in people with DS, range from 53% to considerably higher than or equal to 80% [16,17], which is similar to the data obtained in the sample from Celaya since in the first measurement the student who had a lower percentage of DBP was 11 and the major one was 92 and for the second measurement the lowest was 9.2% and the greater of 100%, so that despite that in the experimental group in the second measurement if there was difference with respect to the lower percentage of plaque obtained in the first measurement, this is not considered significant since the majority of the participants continued to present higher plaque percentages even higher than in the first measurement.

With regard to the studies found in those that address interventions or educational programs for improving oral health in this type of population were only two, the first is an educational program in which they used participatory affective techniques, a survey of knowledge and practices and a guide to observation of the shape of dental brushing; addressed only students with mild intellectual disabilities. Among their results, 85% of the students achieved acceptable oral hygiene indexes and 90% improved their knowledge [18]; These results coincide with those of this research since the students with mild intellectual disabilities were also those that obtained a marked improvement both in self-care capacities and in the decrease of the percentage of DBP as opposed to those who presented moderate intellectual disability or severe, so we can identify that in this type of interventions it is

extremely important to consider the level of intellectual disability since it does influence the level of effect of the same because at a higher level of intellectual disability is the effect of the intervention .

The second study is an educational intervention strategy in which they applied four collective games with a didactic component according to the psycho-pedagogical diagnosis; their results show that the oral hygiene index before the educational intervention was $70 \text{ to } 78\% \pm 9$, 6 and after the intervention was $66 \text{ to } 60 \pm 11.52$ and in terms of knowledge also obtained significant difference [19], if there was an effect in the improvement of knowledge and in the decrease of the percentage of plaque but still the latter is still high as in this investigation for which it is necessary improve the interventions, increasing the time of application, the impact in the area of motivation and in the family involvement, because although these interventions if they are effective the improvement is extremely gradual and referring to oral hygiene requires percentages of plaque smaller than those obtained to decrease the incidence of periodontal diseases.

4. CONCLUSION

It is fundamental to apply a nursing intervention to improve the oral hygiene of people with DS favoring their capacities for self-care and preventing oral pathologies. But nurses need more training in psychoeducation to improve motivation in people.

CONSENT

All authors declare that 'written informed consent was obtained from the parents or guardians of the study participants for publication of this investigation. A copy of the written consent is available for review by the Editorial office/Chief Editor/Editorial Board members of this journal.

ETHICAL APPROVAL

All authors hereby declare that all experiments have been examined and approved by the appropriate ethics committee and have therefore been performed in accordance with the ethical standards laid down in the 1964 Declaration of Helsinki.

The protocol was approved by Bioethics Committee from University of Guanajuato, Campus Celaya Salvatierra, Division of Health Sciences and Engineering with registry No. CBDCSI-106160929.

REFERENCES

- [1] Benítez Toledo M, López MP, Yamamoto NA. Periodontal disease in adolescent patients with Down syndrome. Case presentation. Contact Us. 2014; 18 (3): 191-198.
- [2] Mazurek D, Wyka J. Down syndrome – genetic and nutritional aspects of accompanying disorders. Rocz Panstw Zakl Hig. 2015; 66(3):189-194.
- [3] Scagnet G. Dental update in the care of the child with Down's Syndrome. Odontol Pediatr. 2013; 12(1):27-40.
- [4] Lizama CM, Retamales MN, Mellado SC. Health care recommendations for people with Down syndrome: 0 to 18 years. Rev Med. Chile.2013; 141: 80-89.

- 310
- 311 [5] Areias C, Pereira ML, Pérez-Mangiovi D, Macho V, Coelho A, Andrade D, et al. Clinical
- 312 approach of children with Down syndrome in the dental office. Av. Odontoestomatol.2014;
- 313 30 (6): 307-313.
- 314
- 315 [6] Sierra C, Navarrete E, Canún S, Reyes AE, Hernández V. Genetics D. D., et al.
- 316 Prevalence of Down syndrome in Mexico using certificates of live birth and fetal death during
- 317 the period 2008-2011. Bol Med of Hosp Infant de Méx. 2014; 71 (5):292–297.
- 318
- 319 [7] Cordoba UD, Portilla CM, Alirio Arteaga CG. Oral hygiene of children, adolescents and
- 320 young people with mild cognitive impairment. Section Original Articles Revista Centro de
- 321 Estudios en Salud. 2010; 1 (12): 34 – 42.
- 322
- 323 [8] Harris ON, Garcia-Godoy F. Preventive dentistry. 2nd edition. Mexico, Modern Manual.
- 324 2005.
- 325
- 326 [9] Cuenca SE, Baca GP. Preventive and community dentistry. Principles, methods and
- 327 applications. 3rd ed. Barcelona, Editorial Masson. 2005 .
- 328
- 329 [10] Ferreira R, Michel RC, Greggi SLA, Resende MLR, Sant’Ana ACP, Damante CA, et al.
- 330 Prevention and Periodontal Treatment in Down Syndrome Patients: A Systematic Review.
- 331 PLoS ONE. 2016; 11 (6): 1-16.
- 332
- 333 [11] Dieguez-Perez M, de Nova-García MJ, Mourelle-Martínez MR, Bartolome-Villar B. Oral
- 334 health in children with physical (Cerebral Palsy) and intellectual (Down Syndrome)
- 335 disabilities: Systematic review I. J Clin Exp Dent. 2016; 8(3):337-43.
- 336
- 337 [12] Benavente GA, Ferrer FE, Francisco del Rey C ..Fundamentos de enfermería. Madrid /
- 338 Valencia. DAE Editions. 2001.
- 339
- 340 [13] VMA Wheel, Isidro OL. State of oral health of children with special capacities of the
- 341 Multiple Care Center No. 4. Sanitary horizon. 2014; 13 (3): 233-237.
- 342
- 343 [14] Aguilar AM, Cañamás SM, Ibáñez CP, Gil LF. Periodontics for the dental hygienist.
- 344 Periodontics. 2003; 13 (3): 233- 244.
- 345
- 346 [15] Ochoa EM, Pineda-Velez E, Cortés C, Cano L F, Díaz JM, García Espinosa P E. Self-
- 347 care in children and young people with down syndrome. Rev. CES Odont. 2013; 26 (2): 59-
- 348 66.
- 349
- 350 [16] Pini DM, Fröhlich P, Rigo L. Oral health evaluation in special needs individuals. Einstein.
- 351 2016; 14(4):501-507.
- 352
- 353 [17] Tirado A, Ramos M, Arrieta V. Periodontal disease and related factors in schoolchildren
- 354 with Down syndrome in Cartagena, Colombia. Advances in odontostomatology. 2016; 32 (4):
- 355 205- 213.
- 356
- 357 [18] Vilvey PL, Díaz VL, Sánchez RL, Martínez NM. Oral health education program for
- 358 children with special educational needs. Revista Cubana de Tecnología de la Salud [Revista
- 359 en internet]. 2014. Available in:
- 360 <http://www.revtecnologia.sld.cu/index.php/tec/article/view/297> [Acceso: 01 Marzo 2017]
- 361

362 [19] Aguirre CJ, Porras RD, Ríos VK. Educational intervention strategy on oral health in
363 patients aged 6 to 32 years with Down's Syndrome. Rev Estomatol Herediana. 2015;
364 25(4):262-67.

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