

Associated Factors of Dental Caries among Intellectually Disabled Persons in Specialized Centers of Ouagadougou

Jocelyne Valerie Gare¹, Filwende Dan Kientega¹, Ouedraogo Carole Nathalie Tenin², Ouattara Seydou^{1,2}, Kabore Wendpoulomde Aime Désire², Nicolas Meda¹

¹Training and Research Unit in Health Sciences, Department of Public Health, Joseph Ki Zerbo University, Ouagadougou, Burkina Faso

²Training and Research Unit in Health Sciences, Department of Dental Surgery, Joseph Ki Zerbo University, Ouagadougou, Burkina Faso

Email: dkientega@gmail.com

How to cite this paper: Gare, J.V., Kientega, F.D., Tenin, O.C.N., Seydou, O., Désire, K.W.A. and Meda, N. (2024) Associated Factors of Dental Caries among Intellectually Disabled Persons in Specialized Centers of Ouagadougou. *Open Journal of Epidemiology*, **14**, 297-311.

<https://doi.org/10.4236/ojepi.2024.142021>

Received: March 11, 2024

Accepted: May 4, 2024

Published: May 7, 2024

Copyright © 2024 by author(s) and Scientific Research Publishing Inc. This work is licensed under the Creative Commons Attribution International License (CC BY 4.0).

<http://creativecommons.org/licenses/by/4.0/>



Open Access

Abstract

Introduction: Several studies have reported a high prevalence of dental caries among the people with intellectual disabilities. In order to identify the sociodemographic, clinical and behavioral factors associated with it, we conducted a study in specialized centers welcoming subjects with intellectual disabilities in Ouagadougou (Burkina Faso). **Objectives:** The objective of this study was to identify the factors associated with it among intellectually disabled in the specialized centers of Ouagadougou. **Methods:** The study was cross-sectional analytical. The survey took place between November 2020 and January 2021 among people with intellectual disabilities in reception centers receiving a grant from the Ministry of Women, National Solidarity, Family and Humanitarian Action. Data collection was done with a questionnaire adapted from the World Health Organization (WHO) and dental caries was recorded according to WHO criteria in decayed, missing or filled teeth generating a DMF index. Logistic regression was used to identify factors associated with the presence of dental caries. **Results:** A total of 193 participants were included in the study with an average age of 12.4 years \pm 7.9. The overall prevalence of caries measured with the DMF index was 58.6% 95% CI [51.2 - 65.8]. It was significantly associated with female gender (OR = 4.2; 95% CI [1.4 - 12.5], p = 0,01), the clinical form of mental illness (epilepsy OR = 3.8 95%; CI [1.2 - 12.7], p = 0,02, trisomy OR = 5.0; 95% CI [1.1 - 22.9], p = 0,03, motor autonomy OR = 0.2 95%; CI [0.1 - 0.7], p = 0,01) and at use of toothpaste OR = 9.33; 95% CI [1.05 - 82.7], p = 0,04. **Conclusion:** Dental caries remains a very present pathology in most people living with an intellectual

disability. Also, it is necessary to put in place prevention strategies to reduce its prevalence and improve access to oral care for these people.

Keywords

Dental Caries, Mental Disability, Intellectual Disability, Associated Factors, Ouagadougou

1. Introduction

Studies from diverse geographical regions have contributed to a growing body of evidence indicating that intellectually disabled individuals are at an elevated risk for dental caries due to a complex interplay of factors [1] [2].

Among factors, we can cite poor oral hygiene, lack of parental support during tooth brushing, limited access to dental care, and socioeconomic determinants [3] [4] [5]. Psychotropic drugs, which are essential for the stabilization of mental disorders, also have side effects on the oral sphere. The most well-known are the disturbance of salivary function and the increased risk of caries and periodontal disease [6].

Unfortunately, Burkina Faso does not have recent information on the subject. The objective of this study was to identify the factors associated with it among people with intellectual disability in specialized centers in Ouagadougou, Burkina Faso.

2. Methods

2.1. Ethical and Regulatory Aspects

The research received:

- Approval from the Ministry of Health's research ethics committee.
- Consent from the Ministry of Women, National Solidarity, Family, and Humanitarian Action's Central Regional Directorate.
- Permission from the administrators of facilities for individuals with intellectual disabilities.

The study ensured voluntary participation, with the aims of the research being clearly communicated to parents or legal guardians of participants. It also maintained the anonymity and confidentiality of participant information.

2.2. Study Design, Period and Population

It was a cross-sectional study with descriptive and analytical purposes. The survey took place from November 2, 2020, to January 22, 2021, in Ouagadougou, at specialized centers subsidized by the Ministry of Women, National Solidarity, Family and Humanitarian Action. Participation was restricted to those who consented and had guardian approval, excluding individuals unable to open their mouths or lacking independence. A full count of eligible participants was performed.

2.3. Data Collection

The primary method for data collection was a questionnaire adapted from the WHO's recommendations for oral health surveys [7]. Data gathering employed strategies including accessing information from reception centers (like medical histories) and conducting face-to-face interviews accompanied by clinical assessments. The event of interest in our study was the presence of dental caries measured by the DMF index (Decayed, Missing, or Filled teeth), a widely recognized measure for evaluating oral health globally [7] [8]. Additional data on socio-demographic details, medical and dental backgrounds, oral hygiene practices, and dietary patterns were also compiled.

2.4. Reproducibility and Quality Control

Before the study commenced, interviewers received training on both the methodology and the data collection tools. Calibration of the two dentist examiners was performed against both a standard examiner and each other, with a minimum of 2 days between re-examinations in a subset of 20 individuals, achieving a Cohen's Kappa coefficient of at least 0.80 for reliability. A preliminary test of the questionnaire was conducted on 20 individuals with intellectual disabilities at a center not included in the study, to refine data collection procedures.

2.5. Statistical Methods

After the collection, the data were entered with the EPIDATA software via a mask created specifically according to the questionnaire used. The data were then transferred to an analysis software STATA MP 16.0 (College Station, Texas 77845, USA). After viewing the data set, some variables were recorded.

The calculation of the DMF was done by adding the three components. The percentage of students with $DMF > 0$ was used as the prevalence of dental caries. The average DMF is determined by putting the total number of DMF teeth in the numerator and the total number of examinees in the denominator.

Means and their standard deviations were calculated for normally distributed quantitative variables. Frequencies were calculated for all categorical variables of interest.

Binary logistic regression was performed to investigate the association between dental caries and the associated factors. The results of the analysis were expressed as odds ratios and 95% confidence intervals. Values of $p < 0.05$ were considered statistically significant in all tests.

3. Results

3.1. Carie Prevalence

The overall prevalence of caries was 58.6% with 95% CI [51.2 - 65.8]. The average DMF index was 2.7 ± 3.7 and was broken down as follows: 485 decayed teeth (D), 10 teeth missing due to caries (M) and 4 filled teeth (F).

3.2. Associated Factors of Dental Caries: Univariate Logistic Regression Modeling

3.2.1. Association between Dental Caries and Socio-Demographic Characteristics

Table 1 presents the sociodemographic characteristics associated with dental caries in univariate analysis.

Fathers' occupation, primary education level and mothers' "self-employed" occupation were significantly associated with dental caries ($p < 0.05$)

Table 1. Socio-demographic characteristics associated with dental caries in univariate analysis.

VARIABLES/MODALITY	Dental carie				OR [95% CI]	p values
	No		Yes			
	n = 77	%	n = 109	%		
Age	0 - <1					0.769
[0 - 7]	24	26.3	24	22.0	1	
[8 - 12[	40	25.0	40	36.7	1.75 [0.39 - 1.62]	0.172
[12 - 20[	27	40.7	27	24.8	0.73 [0.33 - 1.60]	0.424
20+	18	7.9	18	16.5	2.14 [0.75 - 6.16]	0.157
N/A	1	/	0	/		
Gender						0.255
Male	54	70.1	67	62.0	1	
Feminine	23	29.9	41	38.0	1.44 [0.77 - 2.68]	0.255
N/A	0	/	1	/		
Level of education						0.123
No education	25	32.5	44	41.9	1	
Specialized education	25	32.5	35	33.3	0.80 [0.20 - 1.95]	0.528
Maternal level	8	10.4	7	6.7	0.50 [0.16 - 1.53]	0.224
Primary and secondary level	19	24.7	19	18.1	0.57 [0.25 - 1.27]	0.168
N/A	0	/	04	/		
Residence status in the reception center						0.244
Internal	3	3.9	9	8.3	1	
External	74	96.1	100	91.7	0.45 [0.12 - 1.72]	0.244
N/A	0	/	0	/		
Profession of father/guardian						0.003
Public employee	19	30.2	16	17.0	1	
Private employee	19	30.2	17	18.1	1.06 [0.42 - 2.70]	0.899
Independent	20	31.8	43	45.7	2.55 [1.09 - 5.98]	0.031
Others (Farmer/breeder, Pupil / Student , Retired, Unemployed)	5	7.9	18	19.2	4.28 [1.30 - 14.10]	0.017
N/A	14	/	15	/		
Occupation of mother/guardian						0.422
Public employee	11	14.3	7	6.9	1	
Private employee	10	15.7	16	15.7	2.51 [0.73 - 8.63]	0.143
Independent	10	50.0	23	22.6	3.61 [1.08 - 12.05]	0.036
Housewife	35	12.9	52	51.0	2.33 [0.83 - 6.61]	0.110
Others (Retired, Pupil / Student)	4	7.1	4	4.0	1.57 [0.29 - 8.42]	0.598
N/A	7	/	7	/		

Continued

						0.146
Father's education level						
No education	7	11.1	31	31.3	1	
Primary level	11	17.5	17	17.2	0.90 [0.34 - 2.37]	0.829
Secondary level	18	28.6	25	25.3	0.62 [0.25 - 1.58]	0.319
University level	27	42.9	26	26.3	2.87 [0.94 - 8.76]	0.065
N/A	14	/	10	/		
Mother's education level						0.980
No education	20	30.3	38	37.3	1	0.980
Primary level	7	10.6	21	20.6	0.35 [0.13 - 0.94]	0.038
Secondary level	27	40.9	28	27.5	0.42 [0.13 - 1.31]	0.134
University level	12	18.2	15	14.7	0.63 [0.23 - 1.74]	0.377
N/A	11	/	7	/		
Type of locality						0.364
Urban	56	76.7	88	82.2	1	
Peri-urban and rural	17	23.3	19	17.7	0.63 [0.34 - 1.48]	0.364
N/A	4	/	2	/		

Table 2. Medical history associated with caries in univariate analysis.

VARIABLES/MODALITY	Dental carie				OR [95% CI]	p-values
	No		Yes			
	n = 77	%	n = 109	%		
Intellectual disability						
Yes	40	52.0	65	59.6	1	0.298
No	37	48.0	44	40.4	0.73 [0.41 - 1.32]	0.298
N/A	0	/	0	/		
Autism						
Yes	11	14.3	19	17.4	1	0.566
No	66	85.7	90	82.6	0.79 [0.35 - 1.77]	0.566
N/A	0	0	0	0		
Cerebral palsy						
Yes	15	19.5	16	14.7	1	0.388
No	62	80.5	93	85.3	1.41 [0.65 - 3.05]	0.388
N/A	0	/	0	/		
Epilepsy						
Yes	18	23.4	9	8.3	1	0.051
No	59	76.6	100	91.7	2.02 [1.00 - 4.10]	0.051
N/A	0	/	0	/		
Trisomy						
Yes	10	13.0	11	10.0	1	0.540
No	67	87.0	98	89.9	1.33 [0.53 - 3.31]	0.540
N/A	0	/	0	/		
Other disability						
Yes	11	14.3	12	11.0	1	0.505
No	66	85.7	97	89.0	1.35 [0.56 - 3.23]	0.505
N/A	0	/	0	/		
Degree of intellectual disability						
Light	13	28.3	26	38.2	1	0.344
Moderate	16	34.8	25	36.8	0.78 [0.31 - 1.95]	0.597
Severe and deep	11	23.8	6	8.8	0.27 [0.08 - 0.90]	0.033

Continued

Not specified	4	8.7	10	14.7	0.92 [0.28 - 3.03]	0.887
N/A	33	/	42	/		
Motor autonomy						0.194
Total	40	52.6	68	63.0	1	
Partial	24	31.6	27	25.0	0.66 [0.34 - 1.30]	0.230
Absent	12	15.8	13	12.0	0.64 [0.27 - 1.53]	0.314
N/A	1	/	1	/		
Medical treatment						
Tricyclic antidepressants						0.718
Yes	2	2.6	1	0.9	1	
No	75	97.4	108	99.1	1.23 [0.40 - 3.82]	0.718
N/A	0	/	0	/		
Neuroleptics						0.615
Yes	4	5.2	3	2.8	1	
No	73	94.8	106	97.2	1.44 [0.35 - 5.94]	0.615
N/A	0	/	0	/		
Antiepileptics						0.340
Yes	17	22.1	18	16.1	1	
No	60	77.9	91	83.5	1.43 [0.68 - 3.00]	0.340
N/A	0	/	0	/		
Duration of drug treatment						1,000
Less than a year	2	9.1	3	14.3	1	
Less than five years	20	90.9	18	82.7	1 [0.31 - 3.18]	1,000
N/A	55	/	88	/		
General associated pathologies						
Respiratory disorders						0.230
Yes	6	7.8	4	3.7	1	
No	71	92.2	105	96.3	2.22 [0.60 - 8.14]	0.230
N/A	0	/	0	/		

3.2.2. Association between Dental Caries and Medical History

The table above (**Table 2**) presents the medical history associated with poor oral health-related quality of life in univariate analysis.

We noted a significant association between caries and severe and profound degrees of intellectual disability ($p = 0.033$).

3.2.3. Association between Dental Caries and Oral Habits

The table below (**Table 3**) presents the oral habits associated with dental caries in univariate analysis. There was no significant association between history of pain, frequency and reason for visiting the dentist, frequency of brushing, use of toothpaste, use of fluoridated toothpaste and brushing instruments (toothbrush, dental floss) and dental caries ($p > 0.05$).

3.2.4. Association between Dental Caries and Eating Habits

Table 4 presents dietary habits associated with dental caries in univariate analysis. No significant association between dietary habits and dental caries was found ($p > 0.05$).

Table 3. Oral habits associated with dental caries in univariate analysis.

VARIABLES/MODALITY	Dental carie				OR [IC to95%]	p values
	No		Yes			
	n = 77	%	n = 109	%		
History of dental pain/discomfort in the last 12 months						0.055
Yes	10	14.1	26	26.5	1	
No	61	85.9	72	73.5	0.45 [0.20 - 1.02]	0.201
N/A	6	/	11	/		
Frequency of visits to the dentist						0.201
Already been to the dentist	7	9.6	19	18.5	1	
Never been to the dentist	66	90.5	84	81.5	0.63 [0.31 - 1.30]	0.201
N/A	4	/	6	/		
Teeth cleaning frequency						0.587
One or more per day	51	70.8	68	66.7	1	
Less than once a day	8	11.3	11	12.7	1.22 [0.47 - 3.16]	0.684
Never	13	18.1	21	20.6	1.21 [0.55 - 2.65]	0.630
N/A	5	/	9	/		
Use of toothpaste						0.103
Yes	57	96.6	78	88.6	1	
No	2	3.4	10	11.4	3.65 [0.77 - 17.32]	0.103
N/A	0	/	21	/		
Use of fluoride toothpaste						0.925
Yes	30	51.7	44	52.4	1	
No	11	19.0	16	19.1	0.99 [0.40 - 2.43]	0.986
Do not know	17	29.3	24	28.6	0.96 [0.44 - 2.09]	0.923
N/A	10	/	10	/		
Use of interdental wire						0.843
Yes	1	2.0	1	1.5	1	
No	49	98.0	65	98.5	1.33 [0.08 - 21.74]	0.843
N/A	27	/	43	/		

Table 4. Dietary habits associated with dental caries in univariate analysis.

VARIABLES/MODALITIES	Dental carie				OR [IC to 95%]	p values
	No		Yes			
	n = 77	%	n = 109	%		
Number of food intake per day						0.2840
≤3 sockets	49	67.1	68	64.8	1	
> with 3 sockets	24	32.9	37	35.3	1.11 [0.59 - 2.09]	
N/A	4	/	4	/		
Confectionery						0.9054
Yes	41	53.2	59	54.1	1	
No	36	46.8	50	45.9	0.97 [0.54 - 1.73]	
N/A	0	/	0	/		
Pastry shop						0.8394
Yes	16	20.8	24	22.0	1	
No	61	79.2	85	78.0	0.93 [0.46 - 1.90]	
N/A	0	/	0	/		

Continued

Acidic and sugary drinks, dairy products						0.2649
Yes	41	53.3	49	44.9	1	
No	36	46.8	60	55.1	1.39 [0.78 - 2.50]	
N/A	0	/	0	/		
Tobacco						0.4043
Yes	3	4.0	2	1.9	1	
No	72	96.0	105	98.1	2.19 [0.36 - 13.42]	
N/A	2	/	2	/		
Alcohol						0.7905
Not consumed during the 30 Days	72	98.6	97	96.0	1	
Consumed during the 30 Days	1	1.4	4	4.0	2.97 [0.32 - 27.13]	
N/A	4	/	8	/		

Table 5. Oral pathologies (or functional signs) associated with dental caries in univariate analysis.

VARIABLES / MODALITIES	Dental carie				OR [IC to 95%]	p values
	No		Yes			
	n = 77	%	n = 109	%		
Sialorrhea						0.066
Yes	14	18.4	33	30.6	1	
No	62	81.6	75	69.4	1.95 [0.96 - 3.96]	0.066
N/A	1	/	1	/		
Dry mouth						0.770
Yes	1	1.3	2	1.8	1	
No	76	98.7	106	98.2	0.70 [0.62 - 7.83]	0.770
N/A	0	/	1	/		
						Dental wear
Severity level						0.089
Yes	7	9.2	20	18.4	1	
No	69	90.8	89	81.6	0.45 [0.18 - 1.13]	0.089
N/A	1	/	0	/		
Number of teeth affected						0.523
=0	14	66.7	24	54.6	1	
>0	7	33.3	20	45.4	1.27 [0.61 - 2.65]	0.523
N/A	0	/	0	/		
						Dental trauma
Trauma status						0.436
Yes	9	11.7	17	15.7	1	
No	68	88.3	91	84.3	0.71 [0.30 - 1.69]	0.436
N/A	0	/	1	/		
Number of teeth affected						0.623
=0	12	57.1	20	54.1	1	
>0	9	42.9	17	45.9	1.22 [0.55 - 2.67]	0.623
N/A	0	/	0	/		
Malocclusion						0.427

Continued

None	50	64.9	64	59.3	1	
Light	16	20.8	25	23.2	1.22 [0.59 - 2.53]	0.592
Moderate to severe	11	14.3	19	17.6	1.35 [0.59 - 3.09]	0.479
N/A	0	/	1	/		
Periodontal diseases						
Bleeding						0.189
Yes	32	48.5	52	55.3	1	
No	34	51.5	42	44.7	0.64 [0.34 - 1.24]	0.189
N/A	11	/	15	/		
Tartar						0.101
Yes	37	56.1	64	68.8	1	
No	29	43.9	29	31.2	0.58 [0.30 - 1.11]	0.101
N/A	11	/	16	/		

3.2.5. Association between Dental Caries and Oral Pathologies (or Functional Signs)

The following **Table 5** presents the oral pathologies (or functional signs) associated with dental caries. No oral pathology differs significantly from the carious lesion ($p > 0.05$).

3.3. Associated Factors To Dental Caries: Multivariate Analysis

At univariate analysis, fathers' occupation, primary education level and mothers' "independent" occupation were significantly associated with dental caries ($p < 0.05$). A significant association was noted between caries and degrees of severe and profound intellectual disability ($p = 0.033$). No significant association between dental history, oral hygiene habits, dietary habits and dental caries ($p > 0.05$).

After adjustment, factors such as Female gender (OR = 4.16; 95% CI = 1.39 - 12.5, $p = 0.01$), absence of epilepsy (OR = 3.83; 95% CI = 1.16 - 12.62, $p = 0.02$), absence of Down syndrome (OR = 5.01; 95% CI = 1.09 - 22.91, $p = 0.03$), partial motor independence (OR = 0.23; 95% CI = 0.07 - 0.71, $p = 0.01$), not using toothpaste (OR = 9.33; 95% CI = 1.05 - 82.72, $p = 0.04$) were significantly associated with dental caries.

Being female is associated with more than four times higher odds of developing dental caries compared to being male, with this result being statistically significant ($p = 0.01$).

Individuals without epilepsy have approximately four times higher odds of having dental caries compared to those with epilepsy. This outcome is statistically significant ($p = 0.02$), suggesting that epilepsy might have a protective effect against dental caries or that those with epilepsy might engage in behaviors or receive treatments that lower their caries risk. Similar to the absence of epilepsy, not having Down syndrome is associated with five times higher odds of developing dental caries compared to those with Down syndrome. This result is statistically significant ($p = 0.03$), indicating that certain characteristics associated with Down syndrome may offer protection against dental caries.

Individuals with partial motor independence have significantly lower odds (about 77% lower) of developing dental caries compared to those with no motor independence. This statistically significant result ($p = 0.01$) highlights the importance of motor ability in performing oral hygiene tasks effectively.

The absence of toothpaste use is associated with more than nine times higher odds of having dental caries compared to those who use toothpaste. This finding is statistically significant ($p = 0.04$), underscoring the crucial role of toothpaste, likely due to fluoride, in preventing dental caries. (Table 6)

Table 6. Adjusted Odds Ratios of Dental Caries Risk in People with Intellectual Disabilities.

Variable/Modalities	OR	IC 95%	p-value
Age groups			
[0 - 7]	1		
[8 - 12[	1.89	[0.46 - 7.68]	0.37
[12 - 20[	1.47	[0.34 - 6.24]	0.60
20+	3.38	[0.49 - 23.18]	0.21
Gender			
Male	1		
Female	4.16	[1.39 - 12.5]	0.01
Father's level of education			
No education	1		
Primary level	1.26	[0.31 - 5.09]	0.74
Secondary level	0.66	[0.16 - 2.69]	0.56
University level	4.59	[0.91 - 23.19]	0.06
Intellectual disability			
Yes	1		
No	1.13	[0.44 - 2.92]	0.80
Epilepsy			
Yes	1		
No	3.83	[1.16 - 12.62]	0.02
Trisomy			
Yes	1		
No	5.01	[1.09 - 22.91]	0.03
Motor autonomy			
Total	1		
Partial	0.23	[0.08 - 0.71]	0.01
Absent	2,54	[0.41 - 15.73]	0.31
Toothpaste			
Yes	1		
No	9.33	[1.05 - 82.74]	0.04
Frequency of teeth cleaning			
One or more per day	1		
Less than once a day	1.68	[0.36 - 7.78]	0.50
Never	2.62	[0.19 - 36.94]	0.47

4. Discussion

Subjects with intellectual disabilities are more likely to develop dental caries than peers without intellectual disabilities [2]. Our study allowed us to identify associated factors of dental caries among people with intellectual disabilities in the specialized centers of Ouagadougou. Dental caries was significantly associated with Female gender (OR = 4.16; 95% CI = 1.39 - 12.5, $p = 0.01$), absence of epilepsy (OR = 3.83; 95% CI = 1.16 - 12.62, $p = 0.02$), absence of Down syndrome (OR = 5.01; 95% CI = 1.09 - 22.91, $p = 0.03$), partial motor independence (OR = 0.23; 95% CI = 0.07 - 0.71, $p = 0.01$), not using toothpaste (OR = 9.33; 95% CI = 1.05 - 82.72, $p = 0.04$).

Females were at high risk of developing caries in our study. There is evidence indicating that many caries risk factors provide a gender bias, placing women at a higher caries risk. Generally, dental caries disproportionately affects the poor and racial or ethnic minorities worldwide, with women suffering more from the disease [9]. Liu and al have shown that caries rates are higher in women than in men [3]. Anusha and al also noted in their study that mean DMFT was low among males when compared to females [10]. Indeed, risk factors for caries in women include different salivary composition and flow, hormonal fluctuations, dietary habits, genetic variations, and particular social roles within their families [11].

Subjects with epilepsy were less likely to develop caries. It should be noted that the authors do not agree on this subject. So, if for Anjomshoaa and al. [12], there is a strong association between dental caries and epilepsy, this is not the case for Johnston and al. [13] who showed the opposite. According to Tiwari and al, the observed higher mean values for caries indices are in all likelihood, the result of a conjunction of factors such as poor socioeconomic status of epileptic children, lower frequency of dental clinic visits, regular long-term treatment with sugar-containing medicines, the tendency of parents to avoid dental treatment due to inadequate knowledge about epilepsy, and fear that dentist might provoke seizures during treatment [14]. Further investigations are therefore necessary to understand the possible relationship between caries and epilepsy.

Down syndrome was a protective factor for caries in this study. Indeed, some characteristics found in patients with Down syndrome seem to protect them from the risk of caries. Delayed eruption, reduced exposure time to a cariogenic environment, missing teeth due to agenesis or periodontitis, higher salivary pH and bicarbonate levels (providing a better buffering action), microdontia, the presence of large diastemas and shallow tooth grooves all contribute to this lower risk of dental caries [15] [16]. Silva and al. also reported in a meta-analysis that trisomy was a protective factor against caries [17]. Jesse and al noted characteristics (a low pH and alpha diversity) on the overall composition of the oral microbiome in Down syndrome that present a potentially cariogenic environment. However, the low incidence of caries seen in the literature may maybe be

cause the unique dentition typically seen in Down syndrome impedes the early colonizers of dental plaques [18].

Subjects with partial independence had a lower risk of developing dental caries compared to those with no independence. Indeed, the degree of motor impairment is directly proportional to the likelihood of developing dental caries [19]. Low physical abilities or decreased manual dexterity among this group could cause difficulty in performing appropriate oral hygiene practices [20]. In many cases, caregivers need to actively assist with daily oral hygiene procedures and sometimes even need to perform this task for people with intellectual disability. It is important to stress that both individuals with intellectual disability, in all age groups, and their caregivers ought to be professionally instructed in proper tooth brushing techniques by dental practitioners within the scope of supportive oral hygiene interventions [21].

Individuals without toothpaste have a high risk of developing caries. Toothpaste helps to remove plaque and food debris, thus contributing to the reduction of the risk of developing caries [22]. Also, using fluoridated toothpaste is consistently found to reduce dental caries. Use of topical fluoride exposure, such as fluoride mouth rinse, fluoride gels and fluoride varnishes is also recommended as their benefits for oral health are well established throughout the literature [23].

Individuals who cleaned their teeth less than once a day or never, exhibited an increased odds ratio (OR) of 1.68 ([0.36 - 7.78], $p = 0.50$) and 2.62 ([0.19 - 36.94], $p = 0.47$), respectively, compared to those who cleaned their teeth one or more times per day. This result highlights a trend where less frequent teeth cleaning is associated with a higher risk of dental caries among people with ID. However, our findings, while pointing towards the importance of regular toothbrushing, did not show a statistically significant association between the frequency of toothbrushing and the incidence of dental caries, contrasting with Liu *et al.*'s study [3], which underscored the positive impact of regular oral hygiene practices on reducing the prevalence of dental caries among children with intellectual disabilities. Our result could be due to a small sample size.

The significant association between dental caries and factors such as gender, specific clinical forms of intellectual disability, motor autonomy, and oral hygiene practices, as identified in our study, underscores the complex interplay of biological, behavioral, and care-related factors in dental health among individuals with intellectual disabilities. Our findings contribute to a nuanced understanding of dental caries' etiology in this population, highlighting specific risk factors that may guide targeted preventive strategies.

Our study emphasizes the need for a multifaceted approach to dental care in individuals with intellectual disabilities, integrating gender-sensitive, condition-specific, and autonomy-enhancing strategies. As we advance our understanding of dental caries' associated factors in this population, it is imperative to translate these insights into practice, ensuring that dental health interventions are inclusive, evidence-based, and tailored to meet the unique needs of individu-

als with intellectual disabilities.

5. Limitations

This was a descriptive and analytical cross-sectional study conducted in Ouagadougou in specialized centers for intellectually disabled persons receiving government funding. To ensure the reliability of the data, the clinical examination was performed by two well-trained and calibrated dentists. Although the measure used to quantify the presence of dental caries (DMF index) underestimates the occurrence of caries lesions according to several authors, it remains the quickest method to apply and is recommended by WHO for this type of survey [22]. In addition, the interviews were conducted in collaboration with the parents and at least one of the subject's supervisors (psychologist, monitor) using a recommended standardized questionnaire.

However, potential information bias such as underestimation or overestimation of unhealthy and healthy habits may influence the results to some extent. In addition, recall bias, particularly with respect to dietary and dental experience, must also be considered.

6. Conclusion

This study provided information on the prevalence of dental caries among people with Intellectual Disability in Burkina Faso and identified associated factors. Intellectually disabled persons constitute a vulnerable population group that often does not have access to oral health care. There is a great need for targeted education and training for these individuals and for all those who accompany them in specialized facilities. The data collected could allow the managers of centers for people with intellectual disabilities to advocate with their partners for the improvement of the oral health of people with intellectual disabilities.

Abbreviations

DMF: number of Decayed, Missing due to caries, and Filled Teeth index.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

References

- [1] Ward, L.M., Cooper, S.A., Hughes-McCormack, L., Macpherson, L. and Kinnear, D. (2019) Oral Health of Adults with Intellectual Disabilities: A Systematic Review. *Journal of Intellectual Disability Research*, **63**, 1359-1378. <https://doi.org/10.1111/jir.12632>
- [2] Drumond, V.Z., Souza, G.L.N., Pereira, M.J, De, C., Mesquita, R.A., Amin, M. and Abreu, L.G. (2021) Dental Caries in Children with Attention Deficit/Hyperactivity Disorder: A Meta-Analysis. *Caries Research*, **56**, 3-14. <https://doi.org/10.1159/000521142>

- [3] Liu, Z., Yu, D., Luo, W., Yang, J., Lu, J., Gao, S., *et al.* (2014) Impact of Oral Health Behaviors on Dental Caries in Children with Intellectual Disabilities in Guangzhou, China. *International Journal of Environmental Research and Public Health*, **11**, 11015-11027. <https://doi.org/10.3390/ijerph111011015>
- [4] Petrovic, B.B., Peric, T.O., Markovic, D.L.J., Bajkin, B.B., Petrovic, D., Blagojevic, D.B., *et al.* (2016) Unmet Oral Health Needs among Persons with Intellectual Disability. *Research in Developmental Disabilities*, **59**, 370-377. <https://doi.org/10.1016/j.ridd.2016.09.020>
- [5] Tefera, A.T., Girma, B., Adane, A., Muche, A., Ayele, T.A., Getahun, K.A., *et al.* (2022) The Prevalence of Dental Caries and Associated Factors among Students Living with Disability in the Amhara Region, Ethiopia. *Clinical and Experimental Dental Research*, **8**, 1505-1515. <https://doi.org/10.1002/cre2.646>
- [6] Muster, D., Valfrey, J. and Kuntzmann, H. (2005) Médicaments Psychotropes en Stomatologie et en Odontologie. *EMC—Stomatologie*, **1**, 175-192. <https://doi.org/10.1016/j.emcsto.2005.07.001>
- [7] World Health Organization (2013) Oral Health Surveys: Basic Methods 5th Ed. World Health Organization, Geneva. <https://iris.who.int/handle/10665/97035>
- [8] Klein, H. and Palmer, C.E. (1940) Studies on Dental Caries: X. A Procedure for the Recording and Statistical Processing of Dental Examination Findings. *Journal of Dental Research*, **19**, 243-256. <https://doi.org/10.1177/00220345400190030401>
- [9] Martinez-Mier, E.A. and Zandona, A.F. (2013) The Impact of Gender on Caries Prevalence and Risk Assessment. *Dental Clinics of North America*, **57**, 301-315. <https://doi.org/10.1016/j.cden.2013.01.001>
- [10] Anusha, D., Kengadaran, S., Prabhakar, J., MuthuKrishnan, K., Katuri, L.S., Vigneshwari, S.K., *et al.* (2022) Prevalence of Dental Caries and Gingivitis among Children with Intellectual Disability in India. *Journal of Family Medicine and Primary Care*, **11**, 2351-2355. https://doi.org/10.4103/jfmjpc.655_21
- [11] Ferraro, M. and Vieira, A.R. (2010) Explaining Gender Differences in Caries: A Multifactorial Approach to a Multifactorial Disease. *International Journal of Dentistry*, **2010**, Article ID: 649643. <https://doi.org/10.1155/2010/649643>
- [12] Anjomshoaa, I., Cooper, M.E. and Vieira, A.R. (2009) Caries Is Associated with Asthma and Epilepsy. *European Journal of Dentistry*, **3**, 297-303. <https://doi.org/10.1055/s-0039-1697448>
- [13] Johnston, L. and Vieira, A.R. (2014) Caries Experience and Overall Health Status. *Oral Health and Preventive Dentistry*, **12**, 163-170.
- [14] Tiwari, S., Verma, R.K., Dhull, K.S. and Suma, G. (2021) Assessment of Oral Health Status in Epileptic Children and Healthy Children in Bengaluru City: A Comparative Study. *International Journal of Clinical Pediatric Dentistry*, **14**, 768-773. <https://doi.org/10.5005/jp-journals-10005-2081>
- [15] Chan, A.R. (1994) Dental Caries and Periodontal Disease in Down's Syndrome Patients. *University of Toronto Dental Journal*, **7**, 18-20.
- [16] Hennequin, M., Faulks, D., Veyrone, J.L. and Faye, M. (2000) Le Syndrome Bucco-Facial Affectant les Personnes Porteuses d'une Trisomie-2. *Information Dentaire*, **14**, 1951-1964. <https://www.information-dentaire.fr/formations/le-syndrome-bucco-facial-affectant-les-personnes-porteuses-d-une-trisomie-2/>
- [17] Silva, M.C.P.M.D., Lyra, M.C.A., Almeida, H.C.R., Alencar Filho, A.V., Heimer, M.V. and Rosenblatt, A. (2020) Caries Experience in Children and Adolescents with Down Syndrome: A Systematic Review and Meta-Analysis. *Archives of Oral Biolo-*

- gy, **115**, Article ID: 104715. <https://doi.org/10.1016/j.archoralbio.2020.104715>
- [18] Willis, J.R., Iraola-Guzmán, S., Saus, E., Ksiezopolska, E., Cozzuto, L., Bejarano, L.A., et al. (2020) Oral Microbiome in Down Syndrome and Its Implications on Oral Health. *Journal of Oral Microbiology*, **13**, Article ID: 1865690. <https://doi.org/10.1080/20002297.2020.1865690>
- [19] Jan, B.M. and Jan, M.M. (2016) Dental Health of Children with Cerebral Palsy. *Neurosciences*, **21**, 314-318. <https://doi.org/10.17712/nsj.2016.4.20150729>
- [20] Ashi, H. (2021) Dental Caries Experience among Down's Syndrome Population in Saudi Arabia—A Systematic Review. *Nigerian Journal of Clinical Practice*, **24**, 1109-1116. https://doi.org/10.4103/njcp.njcp_492_20
- [21] Schmidt, P., Suchy, L.C. and Schulte, A.G. (2022) Oral Health Care of People with Down Syndrome in Germany. *International Journal of Environmental Research and Public Health*, **19**, Article 12435. <https://doi.org/10.3390/ijerph191912435>
- [22] Hughes, C.V. and Dean, J.A. (2016) Chapter 7—Mechanical and Chemotherapeutic Home Oral Hygiene. In: Dean, J.A., Éd., *McDonald and Avery's Dentistry for the Child and Adolescent (10th Edition)*, Mosby, St. Louis, 120-137. <https://doi.org/10.1016/B978-0-323-28745-6.00007-7>
- [23] Sadjadpour, F., Hosseinichimeh, N., Pahel, B.T. and Metcalf, S.S. (2024) Systems Mapping of Multilevel Factors Contributing to Dental Caries in Adolescents. *Frontiers in Oral Health*, **4**, Article 1285347. <https://doi.org/10.3389/froh.2023.1285347>