Original Article

Association of Paternal Individual Deprivation Measure with General Anthropometric Data and Dental Caries among 12 to 15 year old school going children, in Tiruvallur District - A cross sectional study

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Abstract

Aim: To determine General anthropometric data and dental caries and their association of paternal Individual Deprivation Measure among 12- to 15-year-old school going children in Tiruvallur District. **Methods and Material:** The Anthropometric data such as Body mass index, Skin fold thickness and mid arm circumference was assessed. The study was also conducted to assess children's paternal deprivation using individual deprivation index (IDM). Paternal deprivation was calculated using Individual deprivation index which comprises of 15 dimensions. Pilot study was done to calculate sample size which is found to be 800. **Results:** Dimension of paternal individual deprivation measure in parent Education, Housing, toileting, family planning, problem in visiting doctor between Government and Private School children was significant with *P* value of 0.0005. Interpretation of Paternal individual deprivation measure was found to be significant among Government and private school children. There was no association of individual deprivation measure with dental caries, but there was an association of Individual paternal deprivation measure with one of the anthropometric measure was mid arm circumference. In paternal deprivation index 21.8% of the children's parent were not deprived, 45.8% were somewhat deprived, 22.6% were deprived, 7.3% were very deprived, 2.6 were extremely deprived among school children.

Keywords: Anthropometric data, children, deprivation, nutritional status

Introduction

Dental caries is defined as the multifactorial microbial infectious disease characterized by demineralization of the inorganic and destruction of organic substance of the tooth. The most common preventable disease of oral cavity is dental caries which is responsible for most of the oral health related pain and loss. Despite of many initiatives taken by World Health Organization, the oral health burden is a long standing problem in many countries. Dental caries is as yet an ignored subject, notwithstanding the affirmation of the WHO that is as yet a significant medical issue in most industrialized nations, wherein 60–90% of children and by far most of the grown-ups are influenced by dental caries.[1] Comparison among the South Asian population showed that Indians had higher prevalence and incidence of dental caries. Consecutively the financial reports implicate that for every rupee spent on dental treatment, fourteen

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Received: 19-01-2020 **Revised:** 12-03-2020
Accepted: 13-03-2020 **Published:** 08-04-2021

Access this article online

Quick Response Code:

Website: www.jfmpc.com

DOI: 10.4103/jfmpc.jfmpc_118_20

How to cite this article: Sasikala M, Prabu D, Manipal S, Bharathwaj VV, Rajmohan M. Association of Paternal Individual Deprivation Measure with General Anthropometric Data and Dental Caries among 12 to 15 year old school going children, in Tiruvallur District - A cross sectional study. J Family Med Prim Care 2021;10:1320-6.

rupees is saved.[2,3] According to WHO, the oral health and general health are closely related to each other in many patterns.[4]

Dental Caries is a chronic disease that consequences from altered equilibrium between the tooth minerals and oral biofilms which young school going children are prone to acquire. In a study by Aligne *et al.*, the author reported that 60% to 90% of the caries burden lies amidst the school children rather than the adult population.[5] The acid production by the bacteria, buffering action of the saliva and fluctuations of the plaque biofilm together result in the consequence of dental caries. Alteration of pH from the critical value pertaining to increase will cause remineralization and decrease might cause demineralization. Thus, the tooth surface is therefore in a dynamic equilibrium with its surrounding environment. Dental Caries is a multifactorial disease and hence the etiology pertaining the same has been shifted from time to time such as lifestyle, socio-economic status, accessibility to oral health care etc.

Malnutrition has been the rudimentary cause of health problems and mortality among children in developing countries.[6] Nutritional deprivation is almost flagrant in children of school age. Because the sub-optimal nutrition gain is naturally reflected on the physical, the school population serves as the vast bed for the assessment of nutritional status so that progress could be made towards improving overall health of the same population.[7]

Methods and Material

A cross-sectional survey was conducted on school going children ages 12–15 was done to determine anthropometric data and prevalence of dental caries. The Anthropometric data such as Body mass index, skin-fold thickness, and mid-arm circumference was assessed.

Inclusion criteria

1. 12- to 15-year-old children
2. Fathers of the children who are recruited as the sample.
3. Children's father who give informed consent
4. School children from 4 taluk in Tiruvallur revenue division
5. Children who have completed 12–15 years on the day of the study

Exclusion criteria

1. Children with Physical and mental disability.
2. Children with long standing systemic illness.
3. Single parental family are excluded for uniformity

The nature and purpose of the study was explained to Institutional Review Board of SRM Dental College and Hospital Ramapuram, Chennai and ethical clearance was obtained with ethical approval number SRMDC/IRB/2017/MDS/No. 701. Permission from directorate of school education was obtained for screening Government school children and permission from the school principal was obtained for screening private school children in Tiruvallur district. Written informed consent from was given to the children's father through children giving them a detailed explanation about the purpose of the study and was collected next day.

Results

Table 1 shows the descriptive data of sample for the study. The total study subject from Government school and private school was 800. Out of these 800 school children, 400 (50%) were from Government school and 400 (50%) were from private school. Based on gender a total of 178 (22.25%) males and 222 (27.75%) females were from Government School whereas 119 (14.8%) males and 281 (35.1%) females were from private school.

Table 2 shows the association of housing with government and private schools. Most of the children gave a mixed response on adequate for minimal decent life and slightly deprived. Furthermore, there was minimal deprivation in private schools than in government schools.

Table 3 shows the association of education with government and private schools. The children belonging to severely deprived response were 7.5% in Government which is higher than 6.3% in Private schools. But in contrary, the least deprivation responses were higher in Private schools than in Government Schools. Most of the study population responded that they were deprived in particular to government schools.

Table 4 shows all 15 dimensions in individual deprivation measure and overall percentage score by adding the private school paternal score and Government school paternal score Categorized under severely deprived, very much deprived, somewhat deprived, slightly deprived, adequate for decent, minimal, life.

Table 5 showed the multivariate analysis of Individual deprivation measure with mid-arm circumference, skin-fold thickness, and dental caries for private school. The study result showed that there was no significant association of Individual deprivation measure with mid-arm circumference, skin-fold thickness, and dental caries among private school children.

Table 6 showed the multivariate analysis of Individual deprivation measure with mid-arm circumference, skin-fold thickness, and dental caries for private school. The study result showed that there was no significant association of Individual deprivation measure with mid-arm circumference, skin-fold thickness, and dental caries among private school children.

Table 1: Descriptive data of the Samples

Schools	Criteria		*n*	Percentage
Government School	Gender	Male	178	22.25%
		Female	222	27.75%
Private School		Male	119	14.8%
		Female	281	35.1%
Total			800	100%

Table 2: Association of housing with government and private schools

			Groups		Total	χ^2	*P*
			Private	Government			
Housing	severely deprived	*N*	9	5	14	35.258	0.0005 **
		%	2.3%	1.3%	1.8%		
	very deprived	*N*	4	2	6		
		%	1.0%	0.5%	0.8%		
	somewhat deprived	*N*	118	199	317		
		%	29.5%	49.8%	39.6%		
	slightly deprived	*N*	118	78	196		
		%	29.5%	19.5%	24.5%		
	adequate for minimal decent life	*N*	151	116	267		
		%	37.8%	29.0%	33.4%		
Total %		*N*	400	400	800		
		100.0%	100.0%	100.0%			

**Highly Significant at *P*<0.01 level

Table 3: Association of education with government and private schools

			Groups		Total	χ^2	*P*
			Private	Government			
Education	severely deprived	*N*	25	30	55	24.706	0.0005 **
		%	6.3%	7.5%	6.9%		
	very deprived	*N*	21	24	45		
		%	5.3%	6.0%	5.6%		
	somewhat deprived	*N*	97	152	249		
		%	24.3%	38.0%	31.1%		
	slightly deprived	*N*	75	72	147		
		%	18.8%	18.0%	18.4%		
	adequate for minimal decent life	*N*	182	122	304		
		%	45.5%	30.5%	38.0%		
Total %		*N*	400	400	800		
		100.0%	100.0%	100.0%			

**Highly Significant at *P*<0.01 level

Table 4: Overall deprivation dimensions and their overall percentage (both Private and Government school)

DIMENSION	Severy deprived (%) (Govt & pvt)	Very much deprived (%) (Govt & pvt)	Somewhat deprived (Govt & pvt)	Slightly deprived (%) (Govt & pvt)	Adequate (%) (Govt & pvt)
FOOD/NUTRITION	0	1	8	12.4	78.6
WATER	3	11.3	10	13.1	62.6
SHELTER (H0USING)	1.8	0.8	39.6	24.5	33.4
HEALTH CARE/HEALTH	11.4	7.6	19.3	11.8	50
EDUCATION	6.9	5.6	31.1	18.4	38
ENERGY/COOKING FUEL	5.8	-	11.5	4.6	78.1
SANITATION	4.1	6.8	3.9	12.0	73.3
FAMILY RELATIONSHIP	1.4	4.5	6.5	45.1	42.5
CLOTHING/PERSONAL CARE	5	3.9	13.3	47	30.9
VIOLENCE	2.9	3.4	9	-	84.7
FAMILY PLANNING	19.9	-	25.5	-	54.3
ENVIRONMENT	10.8	11	30	-	48.3
VOICE	71.8	1.6	5.9	5.5	15.3
TIME USE	15.8	2.8	8.9	15.1	57.5
WORK	6.4	3.5	11.1	26.0	53.0

Table 7 showed the comparison of individual deprivation measure with government and private schools. The table depicts that the children exist without deprivation in Private Schools than the Government Schools. The least deprivation score was from the Private Schools. In case of Deprivation the Government Schools were slightly higher than the Private Schools. Only in response to Slight Deprivation, showed higher response from private schools in contrary to

Table 5: Multivariate analysis of Private school by one-way ANOVA (Individual deprivation with mid arm circumference, skin fold thickness, and dental caries)

Multivariate analysis of Private school by oneway ANOVA								
		n	Mean	S.D	Minimum	Maximum	*F*	*P*
Mid Arm Circumference (CM)	A	62	20.32	4.11	9	30	1.2390	0.294#
	B	177	19.84	4.68	7	28		
	C	115	19.28	4.86	8	28		
	D	32	20.59	2.52	17	27		
	E	14	21.29	2.18	17	23		
Skin fold thickness (CM)	A	62	1.11	0.47	0	3	1.3600	0.247#
	B	177	1.14	0.42	0	3		
	C	115	1.23	0.84	1	9		
	D	32	1.43	1.63	1	10		
	E	14	1.28	0.30	1	2		
Dental Caries	A	62	1.02	1.91	0	8	1.9770	0.097#
	B	177	0.69	1.20	0	5		
	C	115	0.67	1.30	0	5		
	D	32	1.34	2.04	0	8		
	E	14	0.93	1.33	0	4		

#No Significant at *P*<0.05 level

Table 6: Multivariate analysis of Private school by one-way ANOVA (Individual deprivation with mid arm circumference, skin fold thickness, and dental caries)

Multivariate analysis of Private school by oneway ANOVA								
		n	Mean	S.D	Minimum	Maximum	*F*	*P*
Mid Arm Circumference (CM)	A	62	20.32	4.11	9	30	1.2390	0.294#
	B	177	19.84	4.68	7	28		
	C	115	19.28	4.86	8	28		
	D	32	20.59	2.52	17	27		
	E	14	21.29	2.18	17	23		
Skin fold thickness (CM)	A	62	1.11	0.47	0	3	1.3600	0.247#
	B	177	1.14	0.42	0	3		
	C	115	1.23	0.84	1	9		
	D	32	1.43	1.63	1	10		
	E	14	1.28	0.30	1	2		
Dental Caries	A	62	1.02	1.91	0	8	1.9770	0.097#
	B	177	0.69	1.20	0	5		
	C	115	0.67	1.30	0	5		
	D	32	1.34	2.04	0	8		
	E	14	0.93	1.33	0	4		

No Significant at *P*<0.05 level

government schools. The comparison showed statistically significant results.

- Dimension of paternal individual deprivation measure in Hunger between Government and Private School children was not significant with *P* value of 0.211 (not significant when *P* value is >0.05).The children had no hunger in school
- Dimension of paternal individual deprivation measure in Water between Government and Private School children was not significant with *P* value of 0.553 (not significant when *P* value is >0.05)
- Dimension of paternal individual deprivation measure in Housing between Government and Private School children was significant with *P* value of 0.0005 (Highly Significant at $P < 0.01$ level)
- Dimension of paternal individual deprivation measure in Environment problem between Government and Private School children was significant with *P* value of 0.0005 (Highly Significant at $P < 0.01$ level)
- Dimension of paternal individual deprivation measure in Education between Government and Private School children was significant with *P* value of 0.0005 (Highly Significant at $P < 0.01$ level)
- Dimension of paternal individual deprivation measure in Gas fuel between Government and Private School children was significant with *P* value of 0.029 (Significant at $P < 0.05$ level)
- Comparison of groups with Unpaired t-test with significance level as Age = 0.968 (Not Significant), Height (cm) = 0.816 (Not Significant), Weight (kg) = 0.125 (Not Significant),

Table 7: Individual deprivation measure with government and private schools

			Groups		Total	χ^2	*P*
			Private	Government			
IDM Interpritation	Not deprived	*N*	112	62	174	30.980	0.0005 **
		%	28.0%	15.5%	21.8%		
	somewhat deprived	*N*	189	177	366		
		%	47.3%	44.3%	45.8%		
	Deprived	*N*	66	115	181		
		%	16.5%	28.8%	22.6%		
	very deprived	*N*	26	32	58		
		%	6.5%	8.0%	7.3%		
	extremely deprived	*N*	7	14	21		
		%	1.8%	3.5%	2.6%		
Total %		*N*	400	400	800		
		100.0%	100.0%	100.0%			

**Highly Significant at *P*<0.01 level

Mid-Arm Circumference (cm) = 0.0005 (Highly Significant), Skin-Fold Thickness (cm) = 0.018 (Highly Significant), Dental Caries = 0.177 (Not Significant).

Discussion

The Individual Deprivation Index is an unconventional conception which is contemporary of its kind that gauges poverty significantly. Association between the Individual Deprivation Index and the additional variables of the study such as Anthropometric Data and Dental Caries midst school children is an unprecedented concept which facilitates to measure the poverty.

The most imperative oral health concern worldwide among children and adolescents is the liaison between Dental Caries and Body Mass Index. A study conducted by Goodarzi *et al*.[8] was also centered on dental caries and Body mass index among 10- to 12-year-old children which is paradoxical to age group of children in this study.

Body mass index is an index used to measure children weight status gauging from normal or obese. In the present study 52% of the study population were measured as normal which was in accordance with the study by Goodarzi *et al*.[8]

On all-embracing assessment, merely 6.8% of school were in overweight category which indicated that retrogress of Body Mass Index has not surpassed its confines among school children. Though there is no significant association between Body Mass Index (BMI) and deprivation in this study, 41.1% of the school children were in underweight may be due to Malnutrition this may also increase the risk of developing dental caries due to deficiency in protein or energy food and decreased salivary flow.[9] Hence care should be taken for the children who were in underweight. Nutritional level program may increase the children nutritious level and which prevent oral diseases.

Individual deprivation measure is a 15-dimensional tool for computing deprivation status of an individual. Since this indexed embraces dimensional categorizations, the assessment of deprivation were precise and besides this index also evinces the precise dimension in which every individual is deprived. In this study Children's paternal deprivation status were measured pertaining to various dimensions of Individual Deprivation Measure.

In Table 4 of the study, the Hunger dimension showed that almost 78.6% of the school children's were not deprived. This is pertained to the fact that in private schools the children are from a better economic status and hence were not deprived wherein in Government schools, there are Mid-Day Meal Scheme which is predominantly followed and hence the children were not deprived of Hunger.[10] In Water dimension wherein nearly 62.6% of children were not deprived of water. Merely 3% were severely deprived for drinking water which pertaining to the lack of improved source of drinking water available. Data of 2011 census conducted in India revealed that 88.5% of drinking water in rural area were safe that platforms the reason for this dimension of the study.[11]

Pertaining to Housing dimension in Table 4 totally 33.4% children were not deprived. Data from Census 2011 deduced that 46% of rural population had good housing condition which is in accordance with this study. Further on Assessment of association among government school and private school and housing dimension of Deprivation index association showed a statistical significance at $P < 0.05$. The paternal education of every child in school were significantly associated with Government and private schools. Rationalization pertaining to this is that illiteracy among the fathers of government school children consequently leads to unskilled or semiskilled labor jobs from which they can afford to maintain the financial burden of the family which is in contrast to that parents of private school children.

In concern to the dimension of gas fuel with government and private schools showed that almost 78.1% were not deprived.

The rational explanation for the same is that Government has been issuing free gas fuel for families below poverty line and subsidized gas fuel for middle socio-economic class.[12] Hence, the response that gas fuel is adequate for minimal decent life. In Table 4 pertaining to Toileting facilities showed a significant association between government and private school. Almost a total of 73.3% of the school children's family had their own toilets which were adequate for a decent life. The credit of this is to the Swatch Bharat Mission launched in India by 2014 that aimed to cover sanitation universally and eradicate open defecation.[13]

The Environmental Problem Dimension which encompasses air pollution, noise pollution, and water contamination depicted that merely 48.3% of the children's family had privileged life. Pertaining to augmented industrialization and elevated automobile pollution along with improper waste disposal had aggravated this dimensional deprivation.

This study shows that 7.3% were very much deprived when calculated by Individual deprivation index which is in accordance with the study conducted by Nesa aurlene *et al.* in 2019 was found to be 8.3%.[14]

In this study individual deprivation index was not significantly associated to dental caries both in private and Government schools. This result is in accordance with Da Rosa *et al.*[15] wherein the results showed that poverty index does not significantly associate with dental health. Assessment of dental caries midst government and private schools showed a higher prevalence rate amidst government schools than private schools. This is in accordance with the study by Anna Abraham *et al.*[16] conducted in Kerala which resulted that there were more number of caries prevalent in government schools than private schools. This study also shows that overall caries mean score was 1.74 this is in accordance with the study conducted by prabakar *et al.* in 2020 mean caries experience in 11- to 12-year-old school going children with 1.74.[17]

By assessing Body mass index (BMI), Anthropometric measurement and deprivation at the early stage it could able to prevent dental caries at primary level and also prevent the progression of the dental caries at secondary level. So that the concentration of the oral diseases will be more accessed at the primary care and also it will limit the cost of the treatment hence individual can easily afford treatment irrespective of their socio economic status.

Conclusion

This study has found the different aspect of children's basic need such as food, nutrition, and their level of deprivation faced along with their oral health. The result shows that children's father among Government school and private school was very much deprived in housing, Environmental problem, education level, toileting and family planning.

Hence government should address the person who were really need for their basic life such as toileting and housing and has to take care. Government of India has introduced swatch Baharat which will help the people who were really need for clean and safe environment by introducing toileting facilities in their home as well as in public which will also prevent people from communicable disease. Another barriers children's parent on doctor visit from their living home. Children's parent facing several barriers on visiting doctors hence this should be reduced by increasing more number of primary health care hospitals near to their surrounding which will reduce the risk of barriers on doctor's visit. This study shows that there is no association between Dental caries and deprivation but the prevalence of dental caries among government schools is more when compare to private school hence school level oral health program should be conducted which will treat primary level oral diseases and also reduce the risk of developing dental caries in school going children. Thus this study concludes for a policy level alteration to meet the needs of the future generations and implement accurate scales to measure deprivation and charter plans accordingly so that resources that are currently accustomed can be shared likewise.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

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