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LEAD IN TEETH OF A SAMPLE POPULATION OF BAGHDAD

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الرصاص في اسنان القاطنين مدينة بغداد

الخلاصة:

من أجل معرفة مدى تعرض القاطنين لمدينة بغداد لمادة الرصاص تم دراسة معدل تركيز الرصاص في 245 سناً حصل عليهم من الأشخاص المراجعين لمراكز طبابة الاسنان في مدينة بغداد وبشكل عشوائي أخذين بنظر الاعتبار كون الأشخاص لا علاقة لهم بأي عمل فيه مادة الرصاص.

لقد وجد في اسنان الأشخاص القاطنين مركز مابينة بغداد ان معدل تركيز الرصاص كان 34.119 جزء لكل مليون جزء في الاسنان الدائمة و32.133 جزء لكل مليون جزء في الاسنان اللبنية. اما الأشخاص القاطنين ريف مدينة بغداد فقد كان معدل تركيز الرصاص 32.809 جزء لكل مليون جزء في الاسنان الدائمة و23.442 جزء لكل مليون جزء في الاسنان اللبنية.

لقد كان هناك تمايز احصائي في نسب الرصاص الموجودة في الاسنان اللبنية لاطفال مدينة بغداد وذلك عند دراستهم تبعاً لمنطقة سكنهم، في حين لم نجد مثل هذا التمايز الاحصائي في نسب الرصاص بالاسنان الدائمة وذلك عند دراستهم تبعاً لمنطقة سكنهم.

لقد استنتجت الدراسة ان قياس نسبة الرصاص في الاسنان اللبنية يمكن ان يعطي صورة واضحة عن مدى تعرض القاطنين للتلوث بالرصاص.

SUMMARY:

Teeth from 245 randomly selected inhabitants of Baghdad, all without any known exposure to lead, were analysed for lead content. In the City of Baghdad the geometric mean level of lead was 34.119 ppm in permanent teeth and 32.133 ppm in deciduous teeth; in a rural area the levels were 32.809 ppm and 23.442 ppm respectively. There were significant difference in the lead content of deci-

duous teeth derived from children living in different areas, but no such differences in permanent teeth. It is concluded that, in so far as tooth-lead reflects urbanization, this effect is demonstrated much more readily in deciduous teeth than in permanent teeth.

INTRODUCTION:

Exposure to environmental lead varies from day to day; blood lead declines when exposure

re ceases, tends to reflect recent rather than long term exposure and is a poor guide to total body content of lead. Calcified tissue stores lead, more than 90% of body lead being found in bone, but bone biopsy is impractical on a large scale. Moreover, lead in bone is immobile and subject to loss during the process of remodelling, when mineral is withdrawn to meet physiological needs. Dental hard tissue is hardly ever involved in the process of remodelling⁽¹⁾ and therefore the relative stability of dental tissue is of great value in reflecting both past and present intake of lead.

Teeth are easily collected from dental clinics, so analysis of deciduous or permanent teeth offers a way of measuring exposure to lead in communities at risk.

Tooth lead concentration is believed to give information about past exposure which is not obtainable from any other tissue.

Analyses of lead in teeth in different parts of the world were published⁽²⁻¹¹⁾ but these do not include any studies on the population of Baghdad.

This report describes such a study and compares the lead content of deciduous teeth with that of permanent teeth in different districts of Baghdad.

MATERIALS AND METHODS:

Teeth were collected at random from dental patients who had all answered a questionnaire on the day the teeth were extracted. The questionnaire was designed to identify and remove from this random population those who had known occupational or family exposure to lead or lead water pipes (Fig. 1); this left a reference population with no known exposure to lead. Each person having the following characteristics:

1. Healthy-not mentally or physically handicapped.
2. No history of occupational exposure to lead in either the subject or any of his family.
3. No lead water pipes at their homes.

4. Had never used Koohil eye shadow at any time.

212 persons living in the city of Baghdad were selected in this way to represent a reference population with no known exposure to lead. The teeth were collected from dental clinics in 3 different districts of Baghdad, situated on a diameter passing through the city from east to west:

1. Al-Thawra district- low social class.
2. Al-Betaween- City Centre, mixed social class.
3. Al-Yarmook- High social class.

Permanent teeth came from 141 subjects aged 10 to 76 years, and deciduous teeth from children between two and 18 years. Thirty three teeth were collected in the same way from dental clinic in Al Ebdeer a small town in a rural area, 155 miles south of Baghdad. Lead in teeth and blood was measured by atomic absorption (Flameless technique - heated graphite atomizer) (Castilho and Herber, 1977).

RESULTS:

The distribution of lead concentrations was non-normal and the data were transformed to logarithms in order to normalise and compare them.

The number and type of teeth, the geometric mean concentration of lead, and a comparison between deciduous and permanent teeth for each district, are given in Table 1. An analysis of variance between the three districts in terms of tooth lead concentration for both deciduous and permanent teeth is given in Table 2. Blood samples were provided by 61 of the subjects, aged 9-76 years, and were analysed for lead content. All but one of the bloodlead concentrations were less than 50 $\mu\text{g}/100\text{ ml}$, the range being 14.2-46.1 $\mu\text{g}/100\text{ ml}$ and the median 23.2 $\mu\text{g}/100\text{ ml}$.

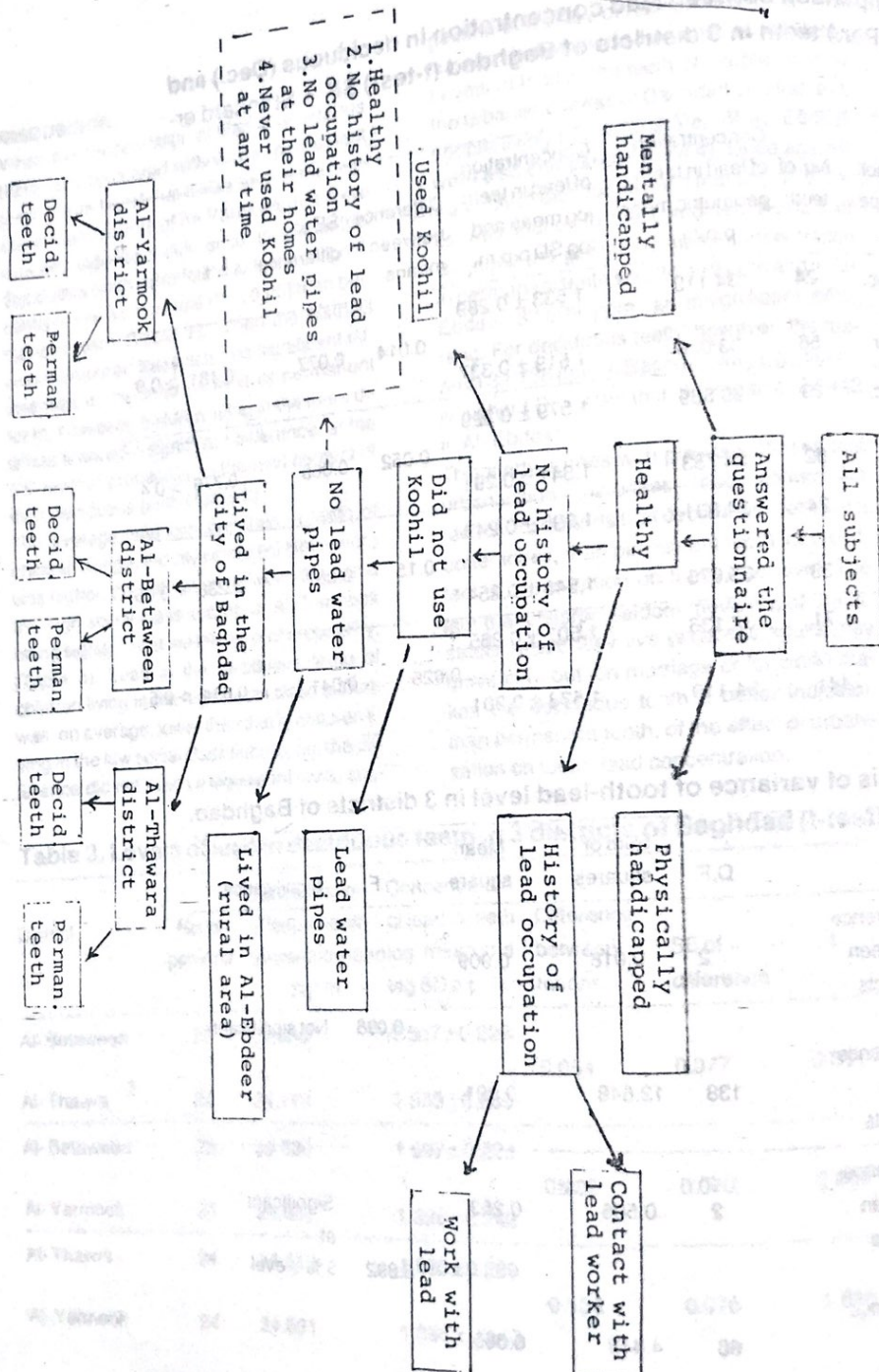


Fig. 1. A model designed to select subgroups either exposed to lead or with no known lead exposure.

355 Table 1. Comparison between lead concentration in deciduous (Dec.) and permanent (Per.) teeth in 3 districts of Baghdad (t-test) SE = Standard error.

District	Tooth type	No. of teeth	Concentration of lead in teeth geometric mean p.p.m.	Concentration of lead in teeth log mean and log SD p.p.m.	Difference between means	SE of difference	t	p
Al-Thawra	Dec.	24	34.119	1.533 ± 0.289	0.014	0.077	0.181	> 0.9
	Per.	56	33.036	1.519 ± 0.337				
Al-Bataween	Dec.	23	39.539	1.579 ± 0.229	0.052	0.068	0.776	> 0.4
	Per.	52	34.753	1.541 ± 0.291				
Al-Yarmook	Dec.	24	24.831	1.395 ± 0.243	0.15	0.067	2.238	< 0.05
	Per.	33	35.075	1.545 ± 0.254				
All districts	Dec.	71	32.136	1.507 ± 0.265	0.026	0.041	0.634	> 0.5
	Per.	141	34.119	1.533 ± 0.301				

Table 2. Analysis of variance of tooth-lead level in 3 districts of Baghdad.

		D.F.	Sum of squares	Mean square	F	Significance
Permanent teeth	Difference between districts	2	0.018	0.009	0.098	Not significant
	Difference within districts	138	12.648	0.091		
Deciduous teeth	Difference between districts	2	0.506	0.253	3.892	Significant at 5% level
	Difference within districts	68	4.448	0.065		

DISCUSSION:

When the concentration of lead in deciduous teeth was compared with that in permanent teeth it was found that it was only in the high social class suburb of Al- Yarmook that there was any significant difference. In this district deciduous teeth were found to have a significantly lower lead content ($P < 0.05$) than permanent teeth (Table 1). When the districts were compared there were no significant differences in the lead content of permanent teeth. However, children living in the three districts showed a significant difference, at the 5% level of probability, in the lead content of their deciduous teeth (Table 2).

The average lead concentration in teeth of children living in the city centre (Al-Betaween) was higher, the difference between them and the high social class suburb of Al- Yarmook being significant at the 2% level of probability, (Table 3). Lead in the deciduous teeth of children living in the high social class suburb was, on average, lower than that in children living in the low social class suburb, but the difference did not reach a significant level, sug-

gesting that place of residence has more influence on tooth- lead than dose social class. Levels of lead in the teeth of people living in the urbanised areas of Baghdad and those in people living in the rural area of Al- Ebdeer were also compared (Table 4). Once again it was only in deciduous teeth that any difference was found. In the combined districts of Baghdad the geometric mean concentration in permanent teeth was 34.119 ppm and in Al- Ebdeer 32.809 ppm, an insignificant difference. For deciduous teeth, however, the mean of 32.136 ppm in Baghdad was significantly higher ($P = 0.05$) than the mean of 23.442 in Al- Ebdeer.

This study agrees with previous studies that urbanisation increases lead content in teeth^(3,12) and finds that deciduous teeth are a better index, than permanent teeth, of the effect of urbanisation on tooth lead level. The fact that children seldom move out of the districts where they live (whereas adults may move in or out, on marriage or for work) makes the deciduous tooth a better indicator, than permanent tooth, of the effect of urbanisation on tooth- lead concentration.

Table 3. Levels of lead in deciduous teeth in 3 districts of Baghdad (t-test).

District	No. of persons	Concentration of lead in teeth geometric mean p.p.m.	Concentration of lead in teeth log. mean and log SD p.p.m.	Difference between means	SE of difference	t	p
Al- Betaween	23	39.536	1.597±0.229	0.064	0.077	0.831	>0.4
Al- Thawra	24	34.119	1.533±0.289				
Al- Betaween	23	39.536	1.597±0.229	0.202	0.070	2.860	<0.02
Al- Yarmook	24	24.831	1.395±0.243				
Al- Thawra	24	34.119	1.533±0.289	0.138	0.076	1.815	>0.05
Al- Yarmook	24	24.831	1.395±0.243				

Comparison between tooth-lead levels in Baghdad and in Al-Eb-

		Lead conc., geometric mean log. p.p.m.	Lead conc., log. mean and log. SD p.p.m.	Difference between means	SE of difference	t	p
Central Baghdad	121	34.119	1.533±0.301	0.017	0.081	0.209	>0.8
The town of Al-Eb-	5	32.609	1.516±0.282				
The city of Deciduous Baghdad	71	32.136	1.507±0.265	0.137	0.069	1.986	=0.05
The town of Al-Eb-	10	23.442	1.370±0.292				

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