CEPHALOMETRIC NORMS FOR LIBYAN POPULATION

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Most of the Cephalometric standards available to us today are the results of studies which were carried out on Caucasians. The present study was undertaken to establish norms for the Libyan population and to lay the foundation for future research. Sixty students were selected to be the subjects of the study, of them thirty were males, and the remaining thirty were females. Lateral Cephalograms were made for all the subjects for the purpose of study. Forty nine angular and linear measurements of skeletal, dental and soft tissues and three proportions were calculated for all the thirty male and female subjects included in this study. The mean values for all the measurements with standard deviation are presented for male subjects, for female subjects and for the total population. For the convenience of clinical application, the values of total population were rounded off to the nearest decimal and are presented along with the standard deviation. Male and female subjects were compared using 't' test and the significant values are presented.

Key words: Norms, cephalometric, Libyan norms

HISTORICAL BACKGROUND OF JAMAHIRIYANS[1]

The study of the population of Libyan Arab Jamahiriya is very interesting because it is unique from all aspects. The history of Jamahiriya is as old as mankind itself. The most recent excavations have proved that the Libyan civilization preceded or was at least contemporary to the Egyptian civilization. They were influenced by traders, visitors, invaders and migrants of Phoenician, Spanish, Italian, Turkish and Byzantine origin.

In the seventh century B.C. Phoenicians settled in the west and the ancient Greeks in the east of the Libyan Arab Jamahiriya (LAJ). Later, the entire country fell under Roman rule until Moslem armies marched victoriously into the two provinces in 643 A.D. Since then, Jamahiriya has become a Moslem Arab country. It was ruled by Caliphs at first, later Ummayad, the Abbasid, the Fatimid, and other Moslem rulers. During the 16th century, Tripoli fell into the hands of Spanish forces, which was taken over again by Ottoman rule.

Jamahiriya was proclaimed an independent State in December, 1951.

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INTRODUCTION

Most of the Cephalometric standards available to us today are the results of studies which were carried out on Caucasians. Those standards cannot be applied to the population of Jamahiriya in view of the unique racial characters. Norms and standards established on the studies of the Libyan population would definitely improve the method of approach of treatment clinically, teaching purpose and for further research work. Hence, the present study was undertaken to establish norms for the Libyan population and to lay the foundation for future research.

MATERIALS AND METHODOLOGY

Materials

Sixty subjects were selected to be the subjects of the study, of them thirty were males, and the remaining thirty were females. The following criteria were used for the selection, of the subjects:

1. Should have all the permanent teeth
2. Teeth should be in acceptable occlusion, i.e. Angle's Class I malocclusion.
3. Subjects should have harmonious facial features.
4. At least for immediate three generations there should not be any racial admixture

Fig-1

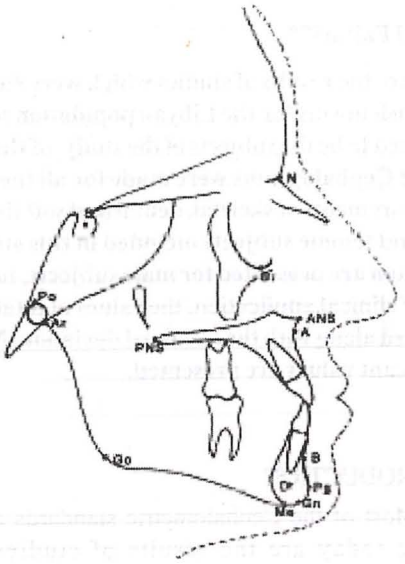


Fig 1 Anatomical Landmarks.

Fig-2

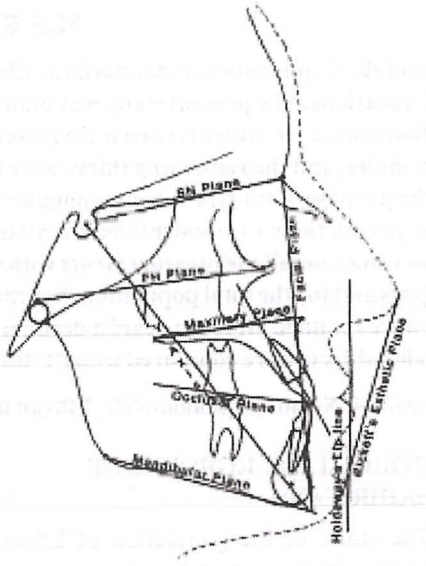


Fig-2 Cephalometric planes used.

5. No history of previous orthodontic treatment
6. Age group of 18 -25 years

All the students were selected from the students of Medical, Dental and Science Faculties of Al Arab Medical and Garyounis Universities of Benghazi. These students come from different cities and towns of Jamahiriya; represent the cross- sectional population of the country.

Lateral Cephalograms were made for all the subjects for the purpose of study.

Methodology

The following landmarks, planes, angular and linear measurements were used for analyzing the cephalogram.

I. Cephalometric Landmarks (Fig. 1)

Sella (S), Nasion (N) point A, B, D, Pogonion (Pg), Gnathion (gn), Menton (Me), Gonion (go), Orbitale (or) Articulare (Ar), Porion (Po), Anterior Nasal Spine (ANS), Posterior Nasal spine (PNS).

II. Cephalometric Planes used (Fig. 2)

1. Sella - Nasion Plane
2. Frankfurt horizontal plane
3. Maxillary plane
4. Occlusal plane
5. Mandibular plane
6. Long axis of incisors
7. Y axis
8. Facial plane
9. Nasion vertical
10. Rickett's Esthetic Plane
11. Holdaway's lip line

III. Angular Measurements:

a) Skeletal:

SNA, SNB, ANB, SND, Facial angle, SN-Pg, Angle of convexity, Maxillary plane to SN, GOGN-SN, FMA, Y axis, N-S-Ar, Articular angle, CV Value, gonial angle, occlusal plane to SN, occlusal plane to FH, FH to NA, FH to NB, AFB.

TABLE-I-A

No	Cephalometric norm	Mean Male	S.D.	Mean Female	S.D.	Mean Total	S.D.	Mean Clinical Norm	S.D.
SKELETAL									
1	SNA	81.56	3.805	81.05	3.184	81.3	3.488	81	81± 3.5
2	SNB	79	3.704	78.53	2.973	78.76	3.338	78.5	78.5 ± 3
3	ANB	2.57	1.395	2.51	1.214	2.54	1.296	2.5	2.5± 1
4	SND	76.4	3.651	75.76	2.667	76.08	3.186	76	76 ± 3
5	FACIAL ANGLE	86.36	3.868	87.4	3.599	86.88	3.740	87	87 ± 3.5
6	SN-Pg	80.15	3.817	79.6	3.307	79.9	3.549	80	80 ± 3.5
7	Angle of convexity	2.88	3.668	3.05	3.497	2.96	3.554	3	3 ± 3.5
8	Maxillary Plane to SN	9.36	3.819	10.9	4.059	10.15	3.986	10	10 ± 4
9	Mandibular Plane to SN	33.2	6.774	33.33	3.77	33.26	5.437	33	33 ± 5
10	FMA	26.38	7.046	25.10	5.08	25.74	6.127	25.5	25.5± 6
11	'Y' Axis	62.11	4.037	60.60	3.69	61.35	3.913	61	61± 4
12	N-S-Ar	125.35	6.380	128.01	6.29	126.68	6.426	126.5	126.5 ± 6
13	Articular angle	144.7	5.350	144.38	8.11	144.54	6.814	144.5	144.5 ± 7
14	Gonial angle	122.61	7.116	120.58	6.84	121.60	6.999	121.5	121.5 ± 7
15	CV Value	206.91	4.410	209.40	5.33	208.15	5.01	208	208 ± 5
16	Occlusal Plane to FH Plane	9.60	4.333	8.50	3.34	9.05	3.87	9	9 ± 4
17	Occlusal Plane to SN	15.73	4.084	17.16	3.51	16.45	3.845	16.5	16.5 ± 4
18	FH to NA	87.65	3.630	89.23	3.87	88.44	3.81	88.5	88.5 ± 4
19	FH to NB	85.08	3.530	86.76	3.71	85.90	3.69	86	86 ± 3.5
20	AFB	2.56	1.39	2.46	1.129	2.51	1.258	2.5	2.5 ± 1
DENTAL									
21	Upper incisor to FH Plane	110.78	6.974	112.73	6.236	111.75	6.632	118	118± 6.5
22	Upper Incisor to SN Plane	104.56	7.56	104.75	6.103	104.658	6.816	104.5	104.5 ± 7
23	Upper Incisor to NA Plane	23.18	6.04	23.28	6.087	23.23	6.015	23	23± 6
24	Lower Incisor to mand.Pl	94.8	7.21	93.85	13.220	94.325	10.57	94.5	94.5 ± 10.5
25	Lower Incisor to NB Plane	26.23	5.179	29.33	15.61	27.78	11.63	28	28 ± 11
26	Upper to Lower Incisor	128.48	9.15	127.26	7.47	127.87	8.31	128	128 ± 8.5
SOFT TISSUE									
27	H angle	9.81	4.27	8.2	3.27	9	3.848	9	9 ± 4

TABLE-I-B

No	Cephalometric norm	Mean in mms male	S.D.	Mean in mms Female	S.D.	Mean in mms Total	S.D.	Mean in mms Clinical Norm	S.D.
SKELETAL-LINEAR									
1	S to N	74.68	3.384	70.86	2.953	72.77	3.690	72.5	72.5±3.5
2	S to Ar	37.46	4.392	34.15	2.924	35.80	4.060	36	36± 4
3	ANS to PNS	56.10	3.596	52.81	2.910	54.46	3.642	54.5	54.5 ± 3.5
4	ANS to Gn	72.63	4.986	67.38	4.082	70.00	5.236	70	70 ± 5
5	N to ANS	56.70	2.926	54.06	3.480	55.38	3.453	55.5	55.5 ± 3.5
6	N to Me	129.33	6.205	121.46	5.051	125.40	6.870	125.5	125.5± 7
7	Ar to Go	86.46	8.605	80.98	4.592	83.72	7.376	83.5	83.5 ± 7
8	Pg to Go	84.46	4.612	80.76	4.151	82.61	4.733	82.5	82.5 ± 5
9	Ar to Pg	112.66	6.32	107.15	3.915	109.90	5.912	110	110 ± 6
10	Nasion vertical to A	-1.46	3.92	-1.31	3.392	-1.39	3.63	-1.5	-1.5 ± 3.5
11	Nasion vertical to B	-7.25	6.55	-6.36	5.539	-6.808	6.03	-7.0	-7.0 ± 6
12	Pg to NB	2.60	1.36	2.20	1.079	2.40	1.52	2.5	2.5 ± 1.5
13	Lower incisor to APg	3.03	2.935	3.73	1.818	3.38	2.44	3.5	3.5 ± 2.5
DENTAL-LINEAR									
14	Upper incisor to NA	5.03	2.23	4.95	2.56	4.99	2.38	5	5 ± 2.5
15	Lower incisor to NB	5.80	2.824	5.88	1.71	5.81	2.315	6	6 ± 2.5
16	Over jet	3.35	1.11	2.8	1.06	3.075	1.115	3	3 ± 1
17	Overbite	3.28	1.55	3.06	1.31	3.175	1.428	3	3 ± 1.5
18	Nasion vertical to 1	3.23	5.79	3.51	4.88	3.375	5.317	3.5	3.5 ± 5.31
19	Nasion Vertical to T	0.1166	5.67	1.21	4.66	0.66	5.181	0.5	0.5 ± 5.18
SOFT TISSUE-LINEAR									
20	Upper lip to 'E' Plane	-5.7	2.500	-6.18	2.9	-5.95	2.696	-6	-6 ± 2.5
21	Lower lip to 'E' plane	-3.15	3.107	-3.4	3.116	-3.27	3.088	-3.5	-3.5 ± 3
22	Tip of the Nose	9.6	4.07	10.8	4.4	10.2	4.250	10	10 ± 4
PROPORTIONS									
23	UFH/LFH	0.77	0.055	0.78	0.0516	0.78	0.053	0.78	0.78 ± 0.05
24	AFH / PFH	0.66	0.0601	0.66	0.036	0.66	0.049	0.66	0.66 ± 0.5
25	Mandibular body length :anterior cranial base	1.13	0.051	1.137	0.06	1.134	0.0572	1.13:1	1.13:1

b) Dental:

1 to FH, 1 to SN, 1 to NA, T to NB, T to MP, T to 1

c) Soft Tissue:

Holdaway's H angle

IV. Linear measurements considered are as follows:

a) Skeletal:

S to N, S to Ar, ANS to PNS, ANS to Gn, N to ANS, N-Me, Ar to Go, Pg to Go, Ar to Pg, Maxilla distance nasion vertical to A, Mandible distance nasion vertical to B and Pg to NB.

b) Dental:

1 to NA, T to NB, over jet, overbite, Edge of 1 to nasion vertical, Edge of T to nasion vertical, T to APg.

c) Soft Tissue:

Esthetic plane to upper lip, Esthetic plane to lower lip, Nose tip from H line.

V. Proportions calculated are:

(a) Upper facial height

Lower facial height

(b) Anterior facial height

Posterior facial height

(c) Mandibular body length: Anterior cranial base

RESULTS

Forty nine angular and linear measurements of skeletal, dental and soft tissues and three proportions were calculated for all the thirty male and female subjects included in this study. The mean values for all the measurements with standard deviation are presented in Table IA & B for male, female subjects, the total population. For the convenience of clinical application, the values are rounded off to the nearest decimal and are presented in column 9 and 10 of the Table I A & B along with the standard deviation. Male and female subjects are compared using 't' test and the significant values are presented in Table II A & B.

DISCUSSION

A review of the literature articles [2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16] on cephalometric analysis indicates that there is no consensus about the number of measurements to be included in any given study. In this study we selected forty nine angular and linear measurements and three proportions to establish norms for Libyan population, which has been presented as the results of the study.

Libyans have a mild retro gnathic maxilla and mandible when compared to Steiner's [10], but the maxillo - mandibular relationship is normal. Mandibular body length is increased as well as the proportion of mandibular body length to the anterior-cranial base according to Bjork's [6, 10]. There is an increase in anterior total facial height as well as lower facial height according to COGS [5]. The inter incisal angle is decreased. They have retrusive lips compared to Rickett's standard [15, 16], prominent nose and chin button according to Down's [10, 15].

On comparing the Libyan norms with the Caucasians[12], it was found that Libyans have normal maxillo-mandibular relation, shorter maxilla, increased lower facial height, retrognathic maxilla and mandible. But Libyans have prominent mandible, chin button and less proclined incisors when compared to Orientals[3]. On the other hand the comparison of Libyan and Egyptian norms[11] shows that there is no gross differences in their values. The details of the comparison will be presented in another article.

Comparison of male and female subjects show that the angular measurements are similar but the skeletal linear measurements show significant changes, i.e. measurements in females are relatively smaller than in males especially of anterior cranial base posterior cranial base, maxillary length, lower facial height, anterior facial height, total mandibular length and the mandibular body length. Thus they show dimensional variation without any angular and proportional change.

TABLE-II-A

No	Cephalometric Norm	Male	Female	p Value	Significance
SKELETAL					
1	SNA	81.56	81.05	-.5703	NS
2	SNB	79	78.53	-.5380	NS
3	ANB	2.57	2.51	-.1579	NS
4	SND	76.4	75.76	-.7671	NS
5	FACIAL ANGLE	86.36	87.4	1.071	NS
6	SN-Pg	80.15	79.6	-.5241	NS
7	Angle of convexity	2.88	3.05	.1801	NS
8	Maxillary Plane to SN	9.36	10.9	1.539	NS
9	Mandibular Plane to SN	33.2	33.33	0.0941	NS
10	FMA	26.38	25.10	-.8088	NS
11	'Y' Axis	62.11	60.60	-1.51	NS
12	N-S-Ar	125.35	128.01	1.629	NS
13	Articular angle	144.7	144.38	-.1785	NS
14	Gonial angle	122.61	120.58	-1.127	NS
15	CV Value	206.91	209.40	1.96	*Significant
16	Occlusal Plane to FH Plane	9.60	8.50	-1.100	NS
17	Occlusal Plane to SN	15.73	17.16	1.45	NS
18	FH to NA	87.65	89.23	1.631	NS
19	FH to NB	85.08	86.76	1.798	NS
20	AFB	2.56	2.46	-.3053	NS
DENTAL					
21	Upper incisor to FH Plane	110.78	112.73	1.141	NS
22	Upper Incisor to SN Plane	104.56	104.75	0.1032	NS
23	Upper Incisor to NA Plane	23.18	23.28	0.0638	NS
24	Lower Incisor to mand.Pl	94.8	93.85	-0.3454	NS
25	Lower Incisor to NB Plane	26.23	29.33	1.032	NS
26	Upper to Lower Incisor	128.48	127.26	-0.5636	NS
SOFT TISSUE					
27	H angle	9.81	8.2	-1.650	NS

NS= Not significant * = <0.05, ** = < 0.02 * = <0.01, **** = <0.001**

SUMMARY

A total of sixty subjects were selected for the present study, of which thirty of them were male and thirty of them were female. Forty nine angular and linear measurements of skeletal, dental and soft tissue were selected for the study. Three proportions were calculated. Based on these measurements, norms for the Libyan population were established. Comparison of male and female subjects shows that there is dimensional variation rather than angular and proportional variation. These statistical values and norms are "Stepping Stones" helpful for clinical work, teaching purpose, as well as for research work.

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TABLE-II-B

No	Cephalometric Norm	Male	Female	P Value	Significance
SKELETAL					
1	S to N	74.68	70.86	-4.653	***
2	S to Ar	37.46	34.15	-3.44	**
3	ANS to PNS	56.10	52.81	-3.89	***
4	ANS to Gn	72.63	67.38	-4.46	***
5	N to ANS	56.70	54.06	3.17	**
6	N to Me	129.33	121.46	-5.385	***
7	Ar to Go	86.46	80.98	-3.079	**
8	Pg to Go	84.46	80.76	-3.265	**
9	Ar to Pg	112.66	107.15	-4.060	***
10	Nasion vertical to A	-1.46	-1.31	0.1583	NS
11	Nasion vertical to B	-7.25	-6.36	0.5638	NS
12	Pg to NB	2.60	2.20	-1.017	NS
13	Lower incisor to APg	3.03	3.73	1.110	NS
DENTAL					
14	Upper incisor to NA	5.03	4.95	-0.1342	NS
15	Lower incisor to NB	5.80	5.88	0. 1382	NS
16	Over jet	3.35	2.8	-1.954	NS
17	Overbite	3.28	3.06	-0.5841	NS
18	Nasion vertical to 1	3.23	3.51	-0.2046	NS
19	Nasion Vertical to 1	0.1166	1.21	-0.8198	NS
SOFT TISSUE					
20	Upper lip to 'E' Plane	-5.7	-6.18	-0.6430	NS
21	Lower lip to 'E' plane	-3.15	-3.4	-0.3111	NS
22	Tip of the Nose	9.6	10.8	1.095	NS
PROPORTIONS					
23	UFH/LFH	0.77	0.78	0.67	NS
24	AFH / PFH	0.66	0.66	-0.2153	NS
25	MANDIBULAR BODY LENGTH :ANTERIOR CRANIAL BASE	1.13	1.137	0.3627	NS

NS= Not significant * = <0.05, ** = < 0.02 * = <0.01, **** = <0.001**

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BOOK REVIEW

Title : **Good Teeth Hold the Key**
Pages : 166
Second Edition
Hindi : सुदृढ़ दांत - स्वास्थ्य का आधार
Pages : 179
Author : **Prof. Dr J.G. Kannappan**
Hindi Translator : Shi Ta. Ka. Kannan
Price: Rs 200 (USD 20)

Prof. Dr. J.G. Kannappan Retd. Principal Tamil Nadu Government Dental College, Chennai, an astute dental educationist and an ardent social worker presented this book on the occasion of Golden Jubilee of Denal Education in Tamil Nadu-2003 as a gesture of his sentiments and concern of Dental Health Promotion in masses and with a pride being the graduate of first batch of Alma matter.

It is a book of common interest carrying 30 chapters covering various scientific aspects of common dental ailments and ifnormation on dental and oral health in modern context including a chapter on forensic dentistry.

Hindi translation of this book has been carried out by Ta. Shi Ka. Kannan an eminent Hindi writer of Tamil nadu. It has been published through Tamil Bhasha Academy, Chennai.

Reviewed by -
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