

5. CONCLUSIONS.

1. Periodontal disease occurred with equal frequency in both the non-diabetic and diabetic groups, only its severity varied.
2. Periodontal disease was more severe in the diabetic group. The mean Russell periodontal index was higher in the diabetics than in the non-diabetics in all age groups studied and in the total group. The significance of the difference in the scores was shown by the "t" test:
  - In the 25-29 year age group  $t = 5.00$  ( $P < 0.001$ )
  - In the 30-39 year age group  $t = 4.56$  ( $P < 0.001$ )
  - In the 40-49 year age group  $t = 5.98$  ( $P < 0.001$ )
 and in the total group:
  - 29-49 years age group  $t = 7.00$  ( $P < 0.001$ )
3. There was a significant correlation  $t = 8.4501$  ( $P < 0.001$ ), and marked relationship  $r = 0.5254$  between the Russell periodontal index and diabetes.
4. Of the local aetiological factors, calculus showed the strongest correlation  $t = 5.9008$  ( $P < 0.001$ ) with a very marked relationship  $r = 0.7559$  to the periodontal index in the diabetic group. The same degree of correlation existed in the non-diabetic group.

However the mean Russell periodontal scores and the mean calculus scores were higher in the diabetics.

5. As toothbrushing frequency increased from one or less to twice or more per day, the periodontal index decreased significantly ( $P < 0.005$ ) in both the diabetic and non-diabetic groups.

## 6. SUMMARY

1. The aetiology of diabetes mellitus was discussed from an historical angle. The present day thoughts are:
  - (a) diabetes is hereditary,
  - (b) there is a prediabetic stage with accompanying angiopathy,
  - (c) insulin in diabetics is often quantitatively normal, but there would appear to be insulin-inhibiting and/or insulin binding materials,
  - (d) there is no present indication which organ is the seat of the primary gene change.
2. The pathology of diabetes was briefly discussed bringing to light the specific lesions known as diabetic angiopathy and the fact that atheromatous and arteriosclerotic lesions occur some ten years earlier and with greater severity in diabetics.
3. The treatment of diabetes is also discussed briefly and different degrees of diabetes described - very mild, mild, moderate, severe and very severe. Three different degrees of control were given according to the presence of glycosuria or not - good, fair or poor.
4. The periodontium was described, it was stated that

increased glucose levels increase mitotic activity in the epithelium and that anaerobic glycolysis is the most important manner of providing energy for keratinisation of the epithelium cells. Hyperglycaemia reduces mitotic activity in the epithelium tissue. The ground substance of the connective tissue is very important against bacterial invasion, and may have some part to play in fibre formation due to its glycoprotein content. Some hormones seem to act on the connective tissue - interfering in the synthesis of acid mucopolysaccharides which results in altered connective tissue physiology and tissue resistance. This last fact must be kept in mind when considering periodontal disease in diabetics. Glycogen would appear to be necessary in the formation of alkaline phosphates which are important enzymes in the metabolism of osteoblasts, osteocytes, cementoblasts and cementocytes. Therefore glycogen lack would affect the alveolar bone and cementum resistance and repair. The periodontal ligament being connective tissue has a ground substance which will be less resistant to bacterial invasion when there is a glycogen lack, as in diabetes - this could be a causative factor in the more severe periodontal conditions in diabetics.

5. Periodontal disease, its clinical signs and symptoms was described.
6. The Russell periodontal index and the oral hygiene index were used in an epidemiological study of 67 diabetic patients with no other medical complications, and 67 non-diabetic "healthy" patients, paired as regards age, sex and the socio-economic educational standards was carried out in Sydney. The statistical results were worked out manually and programmed for the I.B.M. computer.

The statistical results showed that periodontal disease occurred with equal frequency in both groups. The severity of periodontal disease was greater in the diabetic group. The local factors, especially calculus, were very strong aetiological factors. However, in computer selections diabetes showed a very significant correlation. ( $P < 0.001$ ) with the Russell periodontal index.

The factors which increased the severity of periodontal disease in the diabetic may be:

1. Microangiopathy - giving lowered tissue reaction to bacterial invasion and to slow removal of inflammatory products which in turn leads to increased tissue breakdown.
2. Glycogen lack leads to a lower rate of cell mitosis in

epithelium tissue, which gives a slower repair reaction.

3. The connective ground substance is weakened by lack of glycogen and is less resistant to bacterial invasion.

Whether the increased periodontal disease in diabetes is due to one of these facts, a combination of two or three, or to some other yet unknown factor in diabetes, has yet to be determined.

Pilot Study of 64 Patients 32 Diabetics - 32 Non-Diabetics  
MEAN RUSSELL PERIODONTAL INDEX

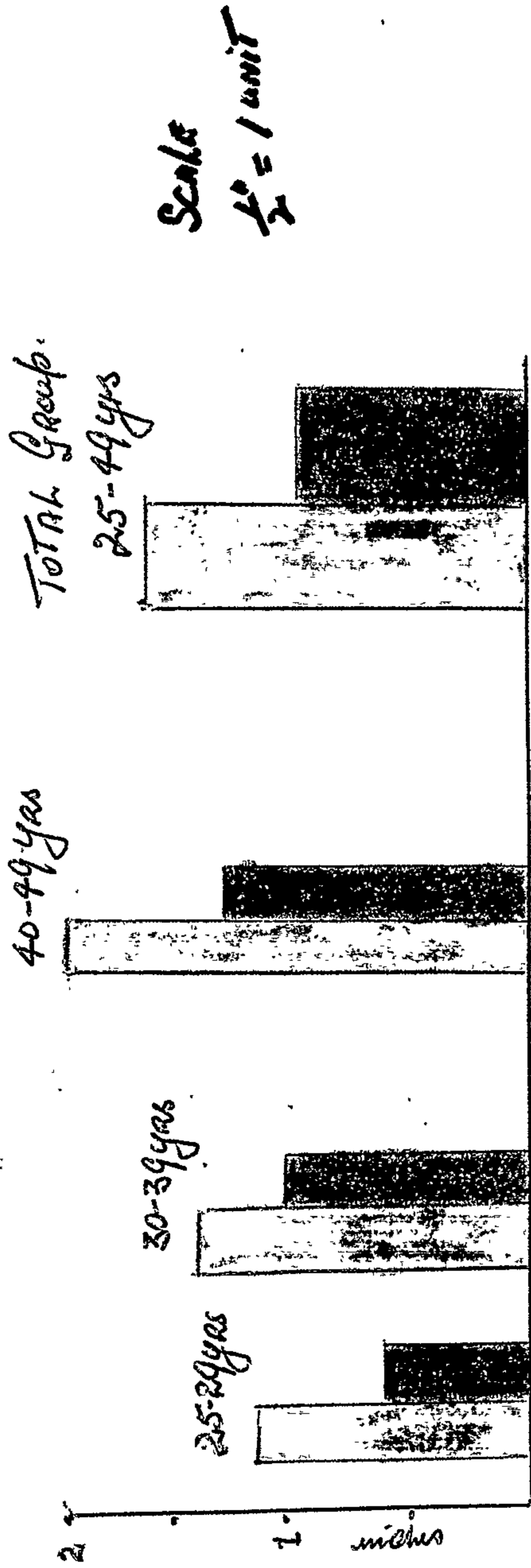


Figure I.

□ MEAN RUSSELL PERIODONTAL INDEX IN DIABETICS  
 ■ MEAN RUSSELL PERIODONTAL INDEX IN NON-DIABETICS

# Diabetic Group Russell Periodontal Index - ICBIS Score

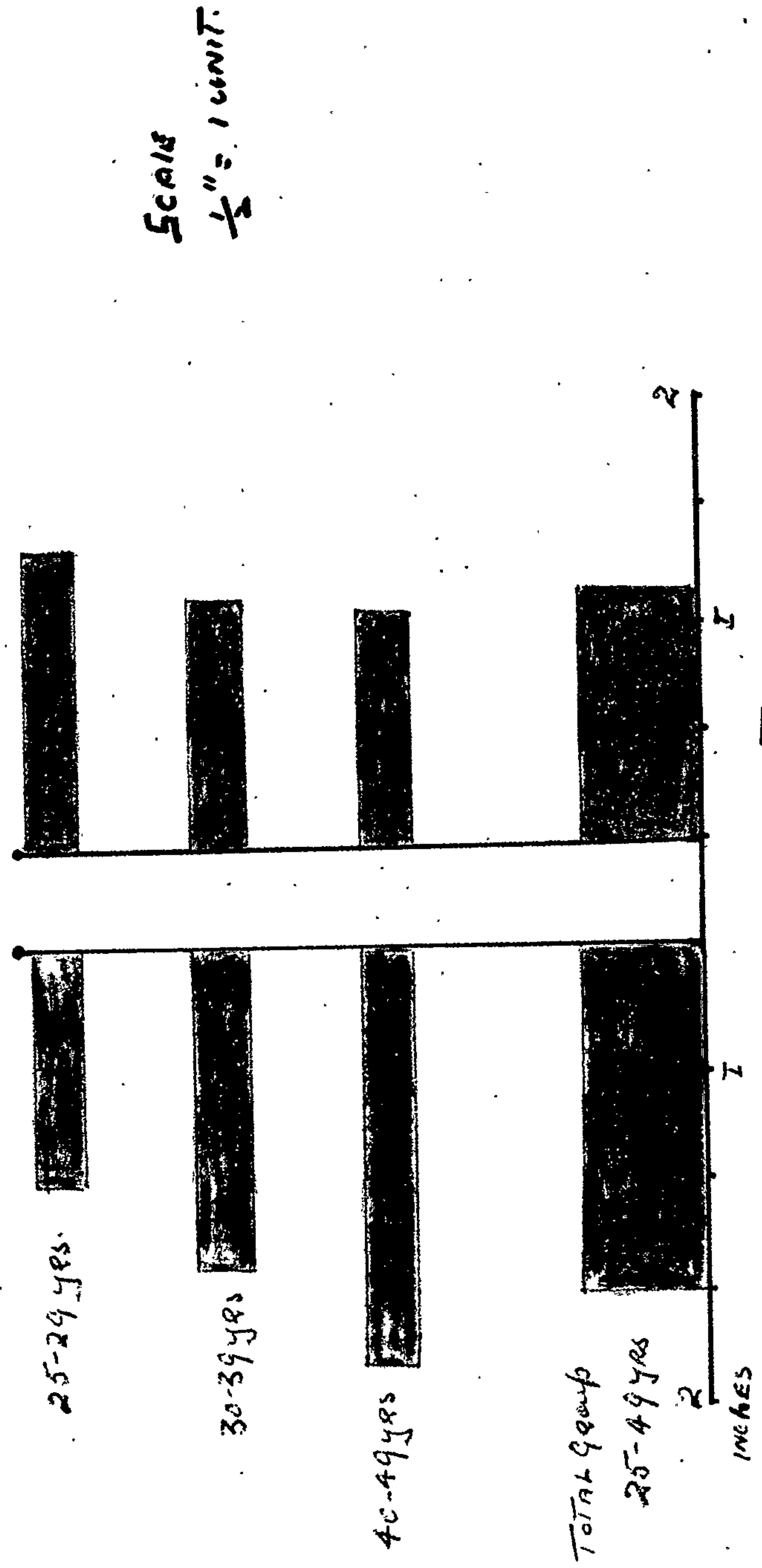


Figure II

□ MEAN RUSSELL PERIODONTAL INDEX IN DIABETICS  
 ■ MEAN ICBIS SCORE IN DIABETICS

# NON-DIABETIC GROUP RUSSELL PERIODONTAL INDEX - JEBB'S SCORE

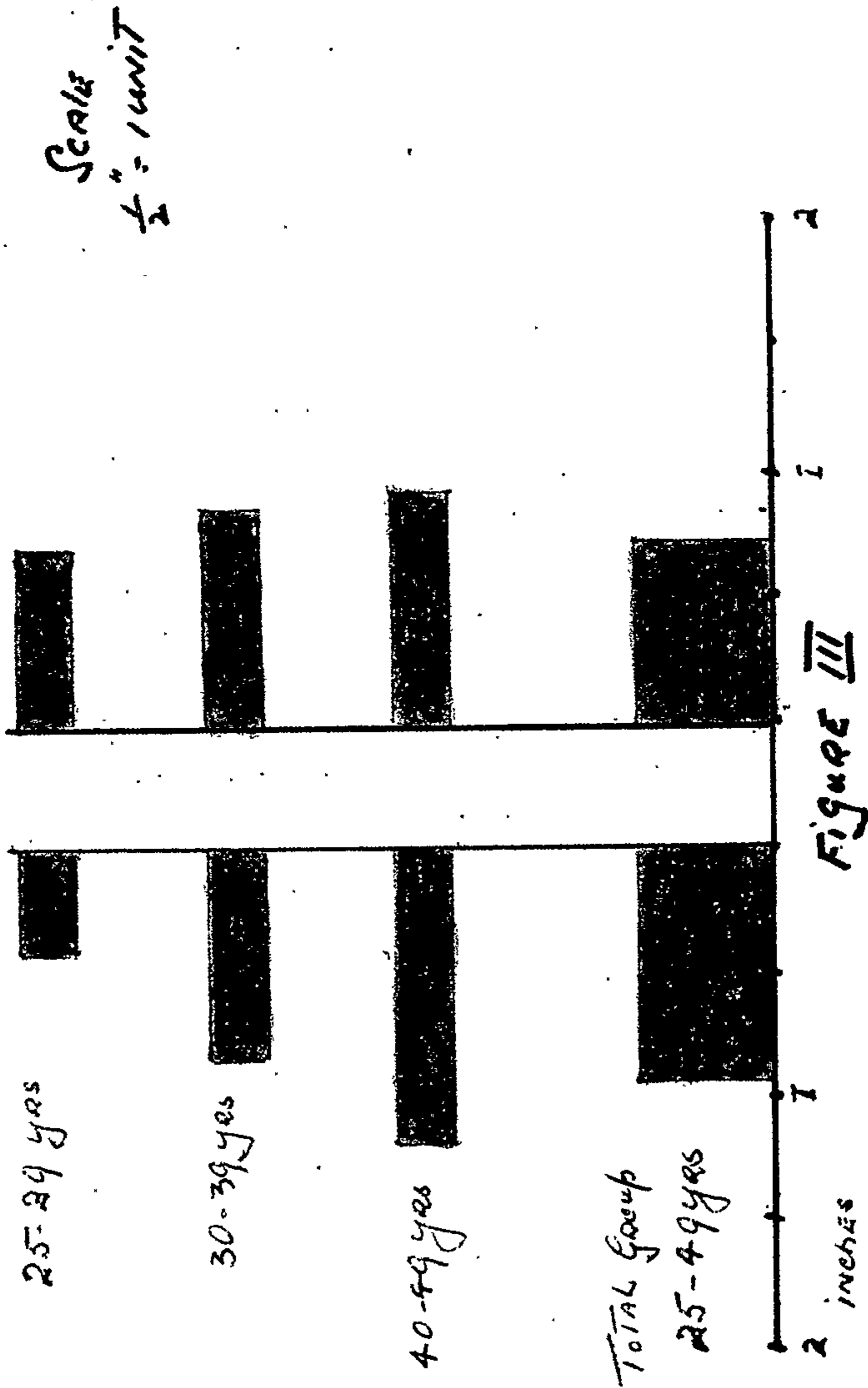
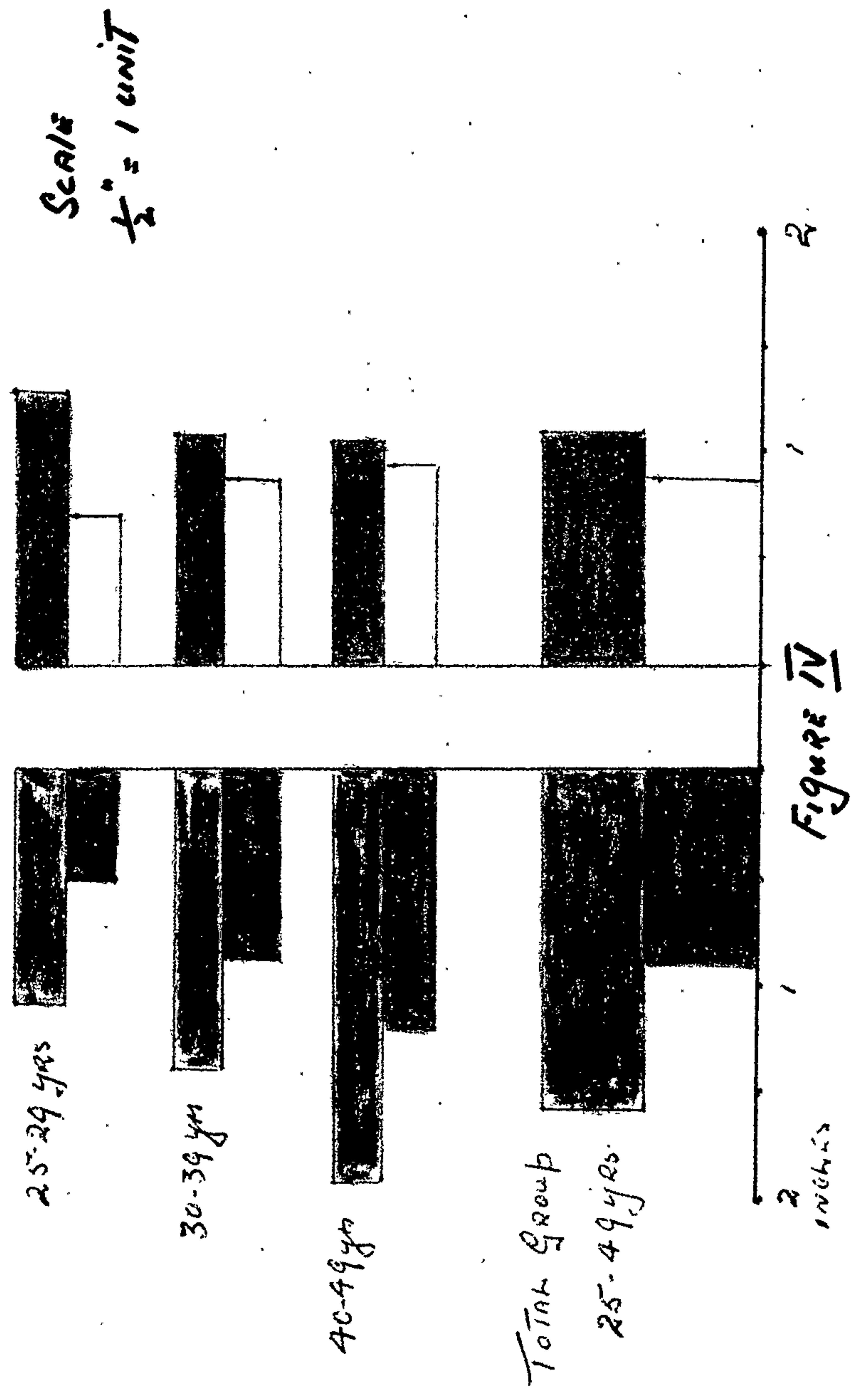


FIGURE III

■ MEAN RUSSELL PERIODONTAL INDEX IN NON-DIABETIC  
■ MEAN JEBB'S SCORE IN NON-DIABETIC.

# DIABETIC AND NON-DIABETIC GROUPS. RUSSELL PERIODONTAL INDEX - DEBRIS SCORE



○ MEAN RUSSELL PERIODONTAL INDEX IN DIABETICS  
 ■ MEAN RUSSELL PERIODONTAL INDEX IN NON-DIABETICS

● MEAN DEBRIS SCORE IN DIABETICS  
 □ MEAN DEBRIS SCORE IN NON-DIABETICS

Diabetic Group.  
RUSSELL PERIODONTAL INDEX - CALculus SCORE

SCALE  
 $\frac{1}{2}$ " = 1 UNIT.

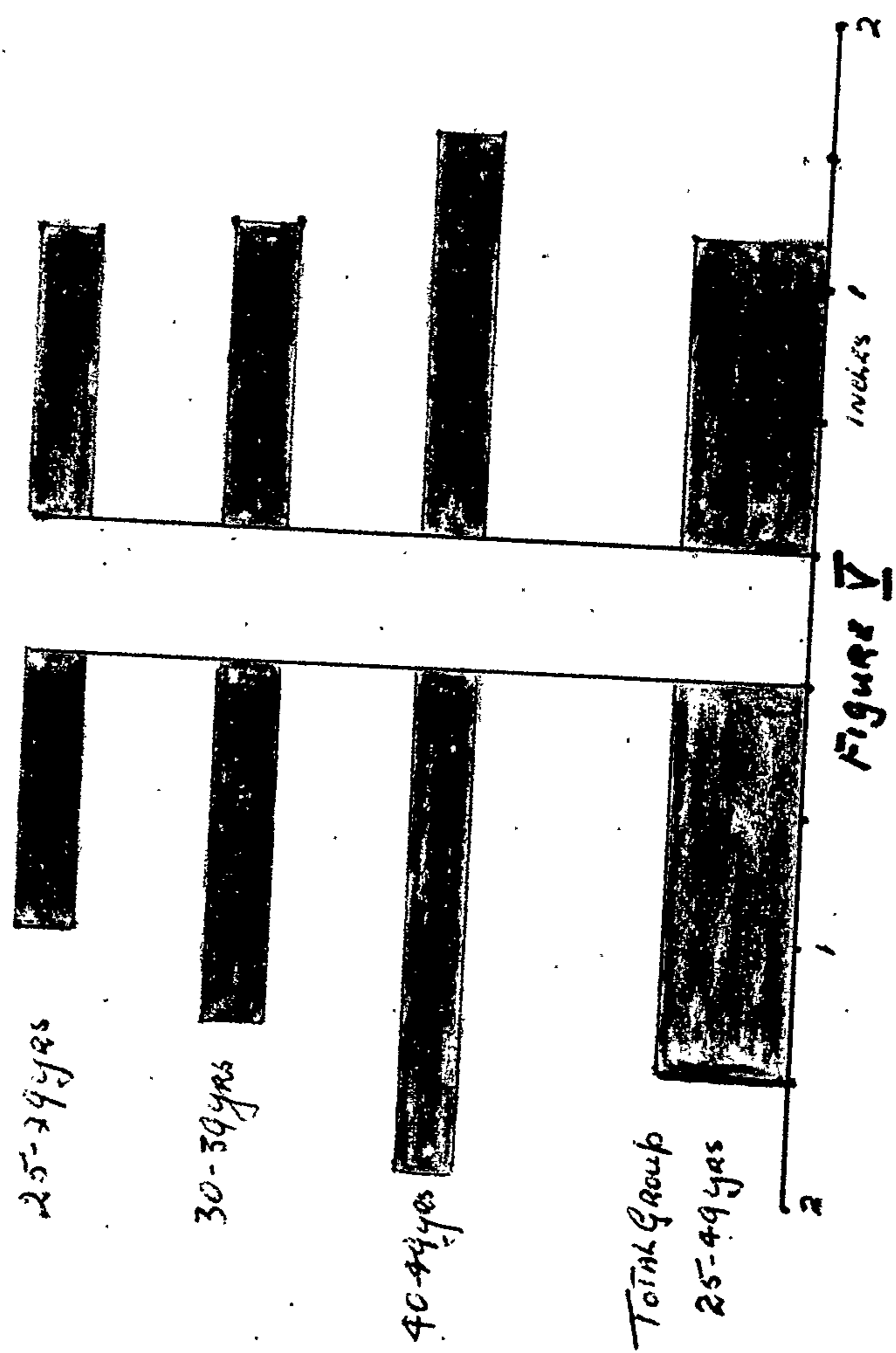


Figure V

■ MEAN RUSSELL PERIODONTAL INDEX SCORE  
 ▨ MEAN CALculus SCORE

# NON-DIABETIC GROUP RUSSELL PERIODONTAL INDEX - CALCULUS SCORE

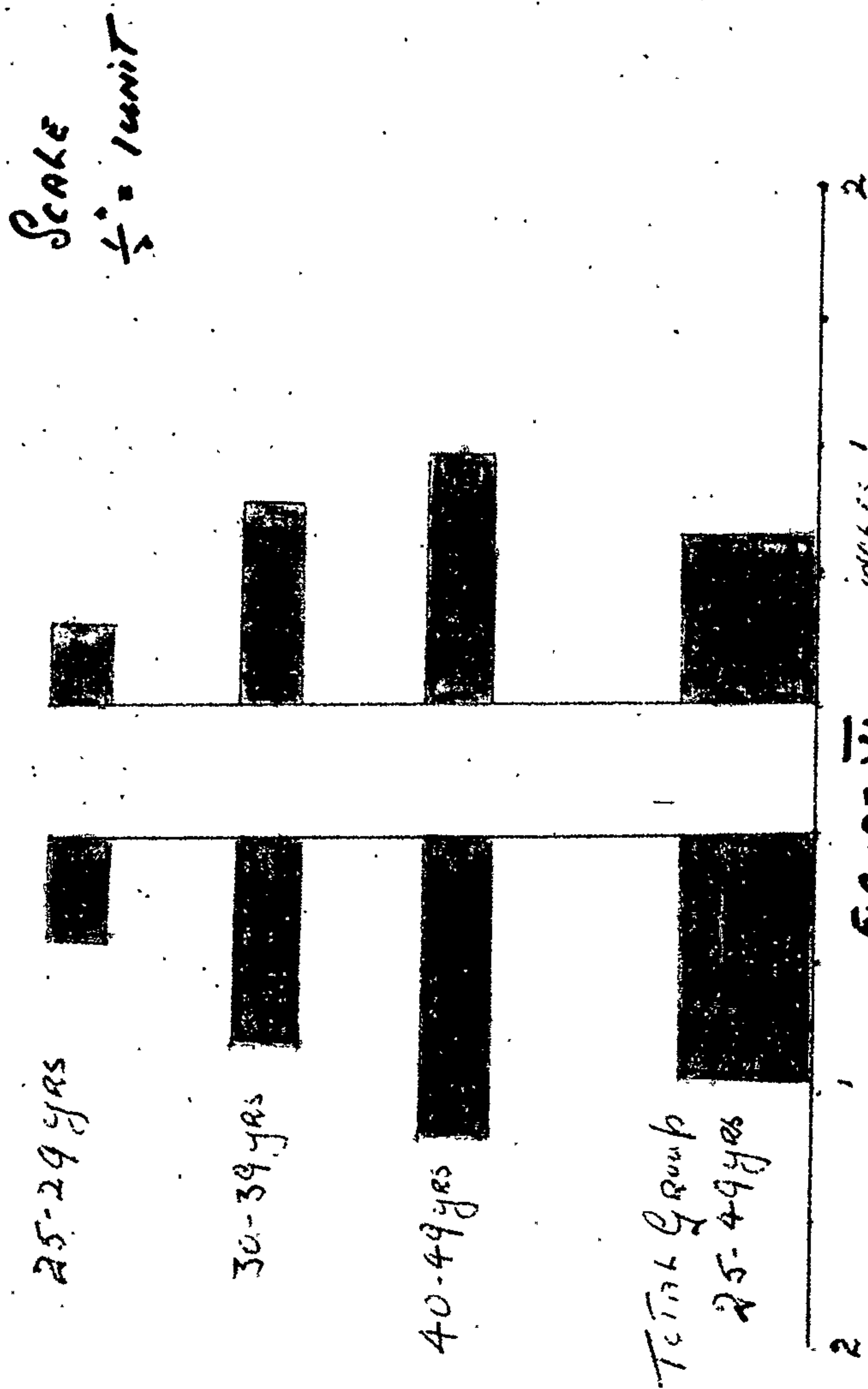


FIGURE VI

■ MEAN RUSSELL PERIODONTAL INDEX SCORE

□ MEAN CALCULUS SCORE

Diabetic and Non-Diabetic Groups.  
 Russell Periodontal Index - Calculus Index

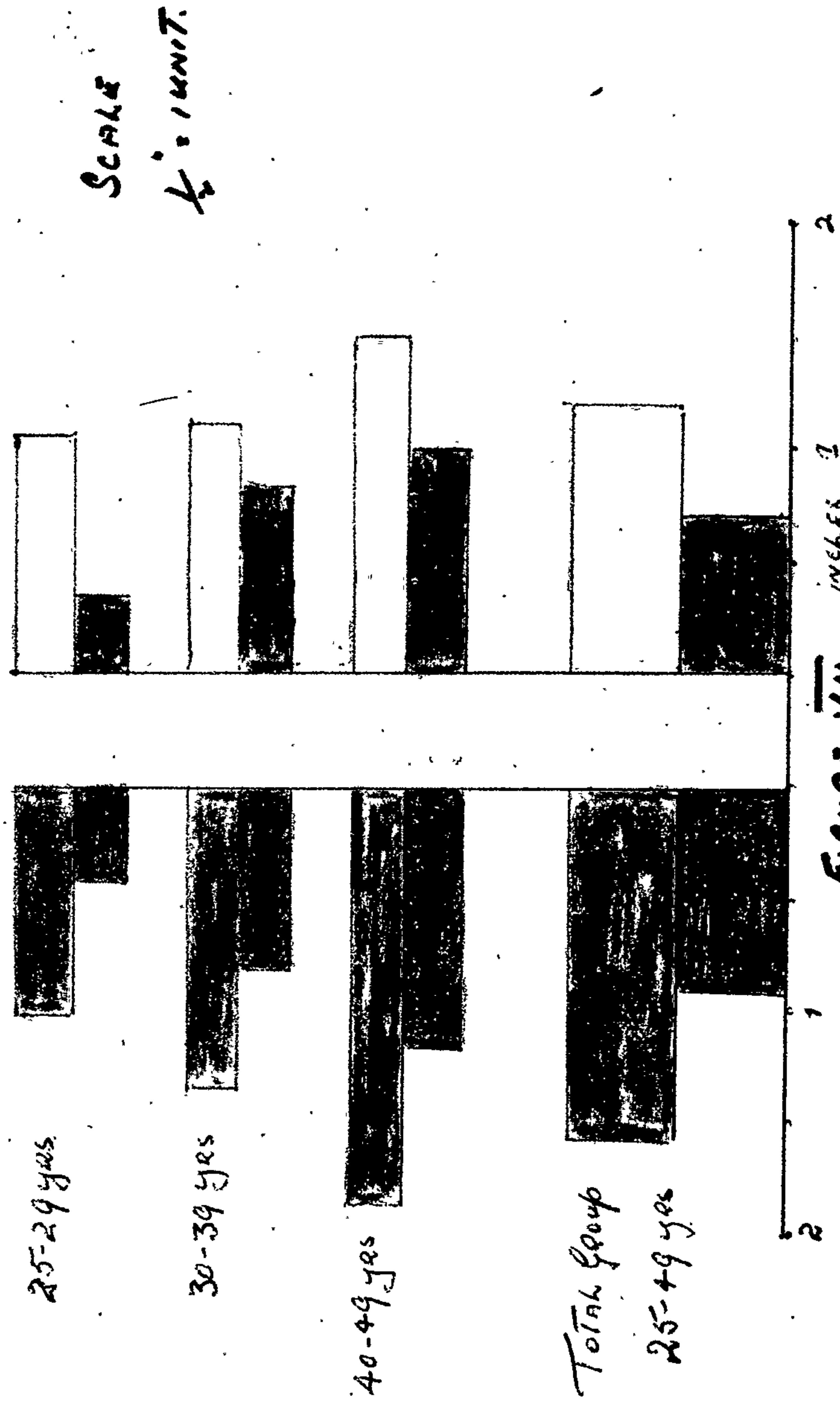


Figure VII

MEAN RUSSELL PERIODONTAL INDEX FOR DIABETICS   
  MEAN CALCULUS SCORE FOR DIABETICS  
 MEAN RUSSELL PERIODONTAL INDEX FOR NON-DIABETICS   
  MEAN CALCULUS SCORE FOR NON-DIABETICS

Diabetic Group.  
Russell Periodontal Index - Oral Hygiene Score



Figure VIII

□ MEAN RUSSELL PERIODONTAL INDEX SCORE

■ MEAN ORAL HYGIENE SCORE

NON-DIABETIC GROUP.  
RUSSELL PERIODONTAL INDEX — HYGIENE SCORE

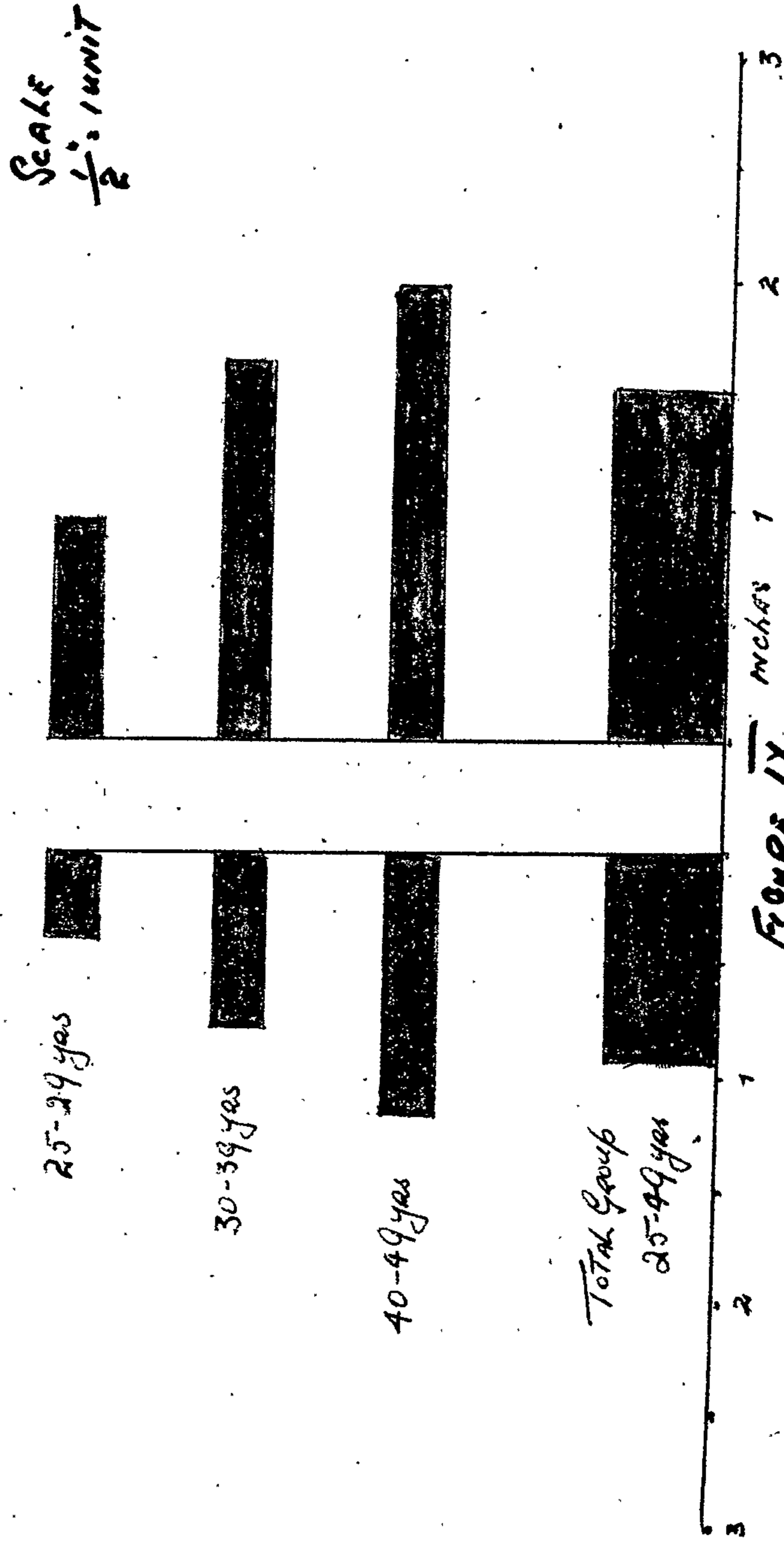


FIGURE IX

■ MEAN RUSSELL PERIODONTAL INDEX SCORE

● MEAN ORAL HYGIENE SCORE.

Diabetic AND Non-Diabetic Groups.  
Russell Periodontal Index - Oral Hygiene Score

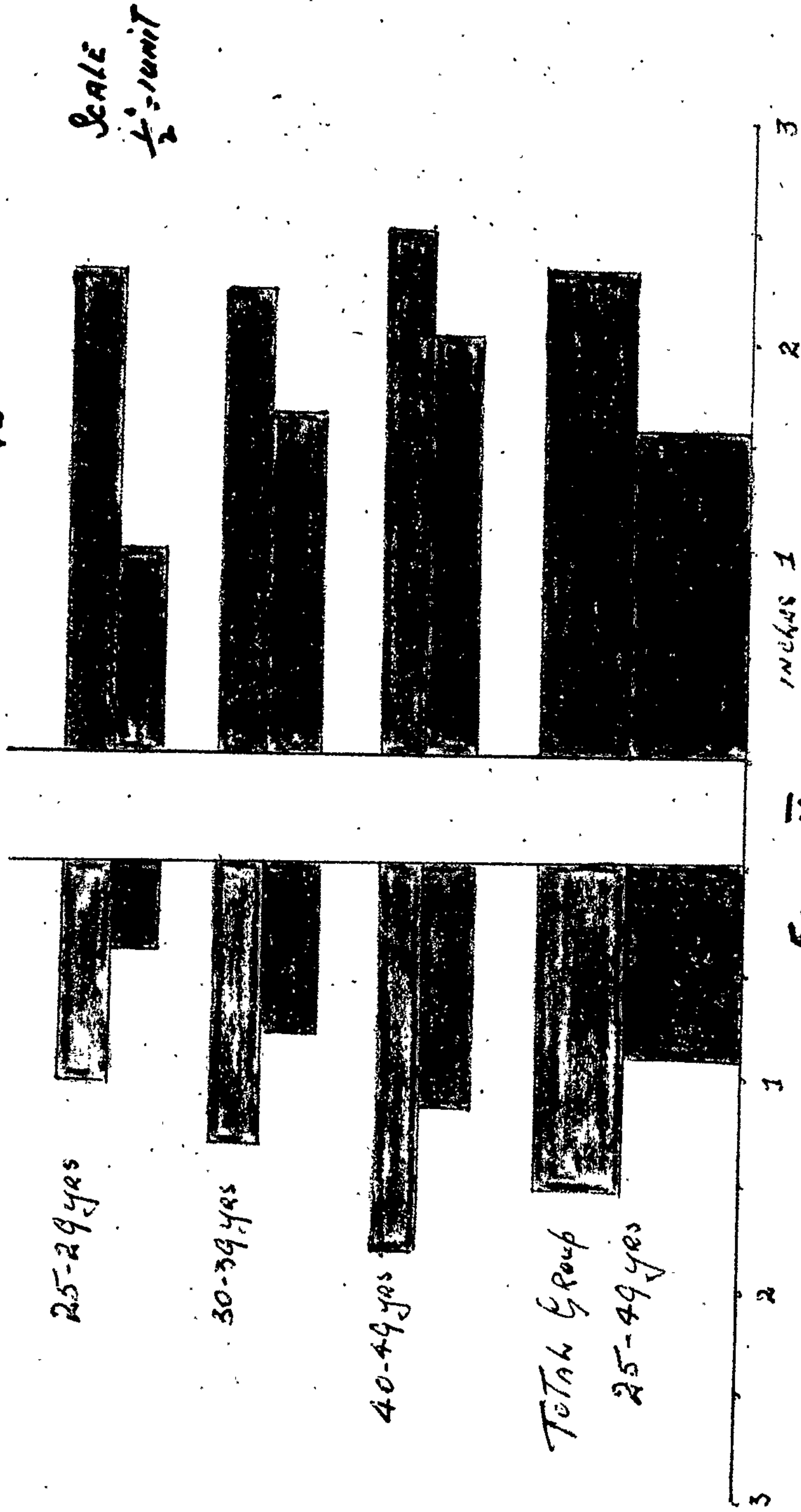


Figure X

□ MEAN RUSSELL PERIODONTAL INDEX IN DIABETICS  
 ■ MEAN RUSSELL PERIODONTAL INDEX IN NON-DIABETICS

PERIOD of DIABETES  
MEAN RUSSELL PERIODONTAL INDEX

SCALE  
1/2" = 1 UNIT

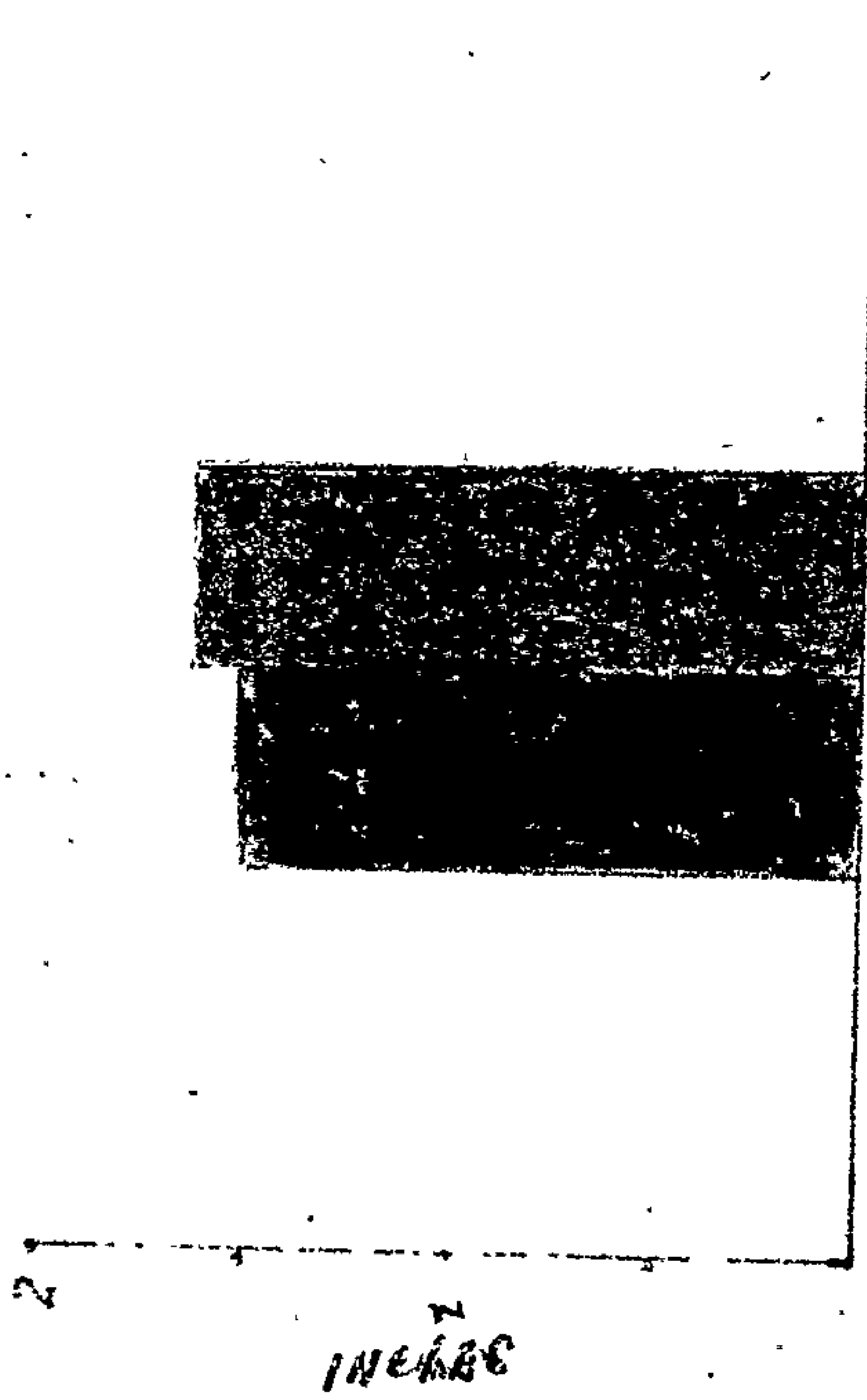


Figure XI

- MEAN RUSSELL PERIODONTAL INDEX IN DIABETICS 0-4 yrs
- MEAN RUSSELL PERIODONTAL INDEX IN DIABETICS OVER 5 yrs

# DIABETIC TREATMENT.

## MEAN RUSSELL PERIODONTAL INDEX. MEAN RUSSELL PERIODONTAL INDEX IN DIABETIC PATIENTS

TREATED WITH :-

- DIET
- ◐ TABLETS
- ◑ UNDER 30% INSULIN
- ◒ OVER 30% INSULIN
- ALL TREATMENT OTHER THAN INSULIN
- ◐ ALL INSULIN TREATMENT
- ◑ ALL TREATMENT EXCEPT OVER 30% INSULIN
- ◒ OVER 30% INSULIN

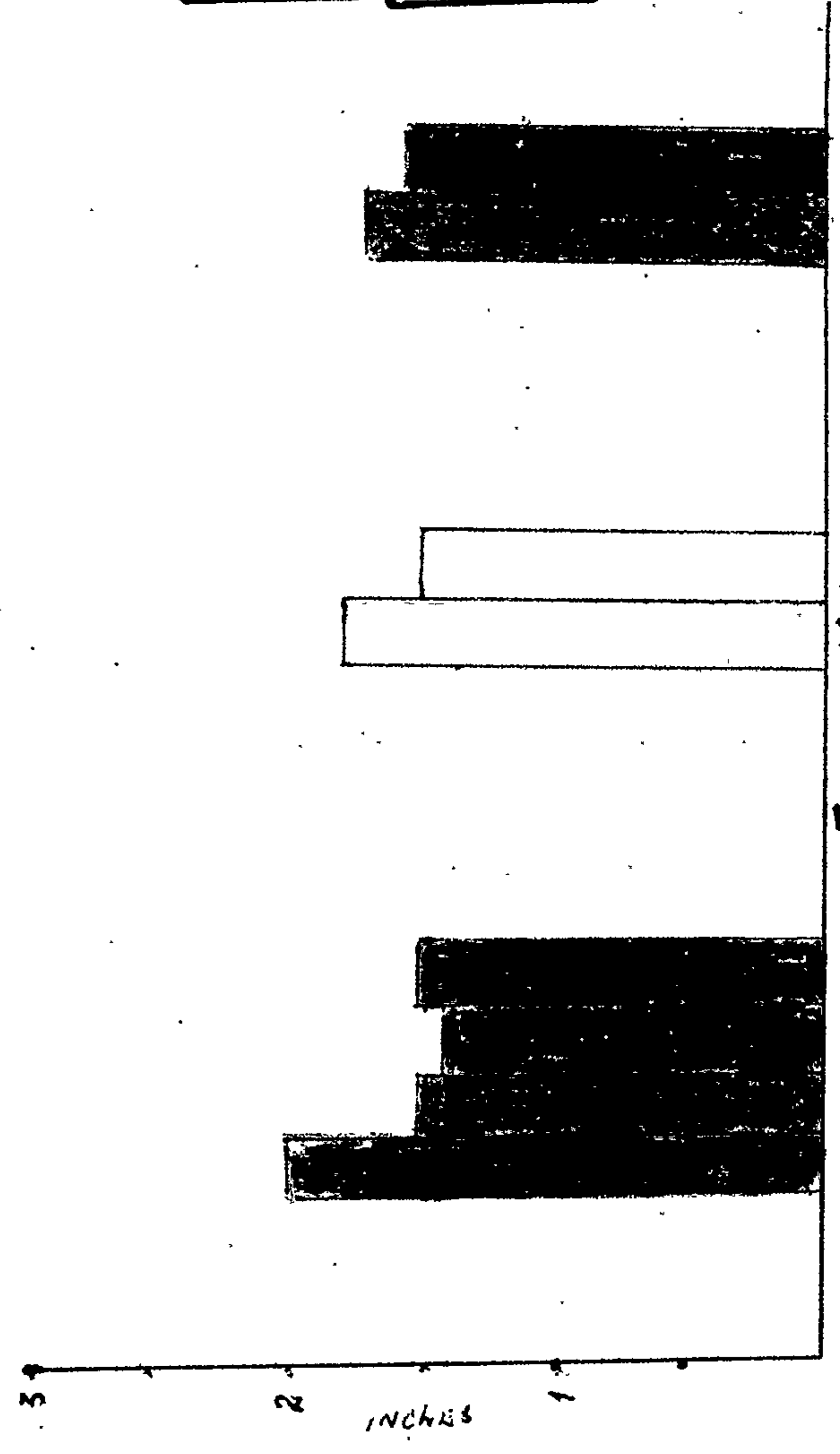


FIGURE XII

SCALE  $\frac{1}{2}$  INCHES

# DIABETIC PATIENTS

## METHOD OF DIABETIC TREATMENT — AGE GROUPS RUSSELL PERIODONTAL INDEX

SCALE  
 $\frac{1}{2}$  = 1 UNIT

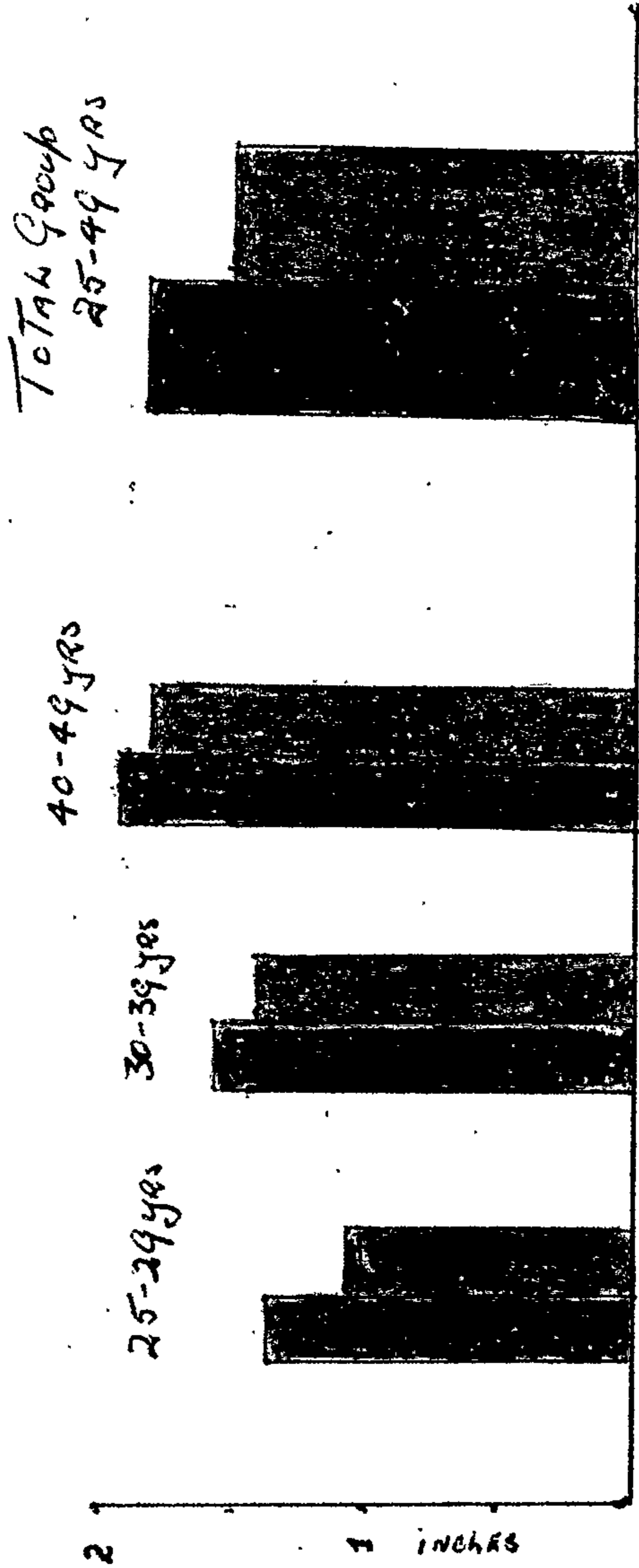


Figure XIII

□ MEAN RUSSELL PERIODONTAL INDEX FOR DIET AND TABLET TREATED PATIENTS  
 ■ MEAN RUSSELL PERIODONTAL INDEX FOR INSULIN TREATED PATIENTS

# STATE of DIABETIC CONTROL MEAN RUSSELL PERIODONTAL INDEX

SCALE  
1/2" = 1 UNIT.

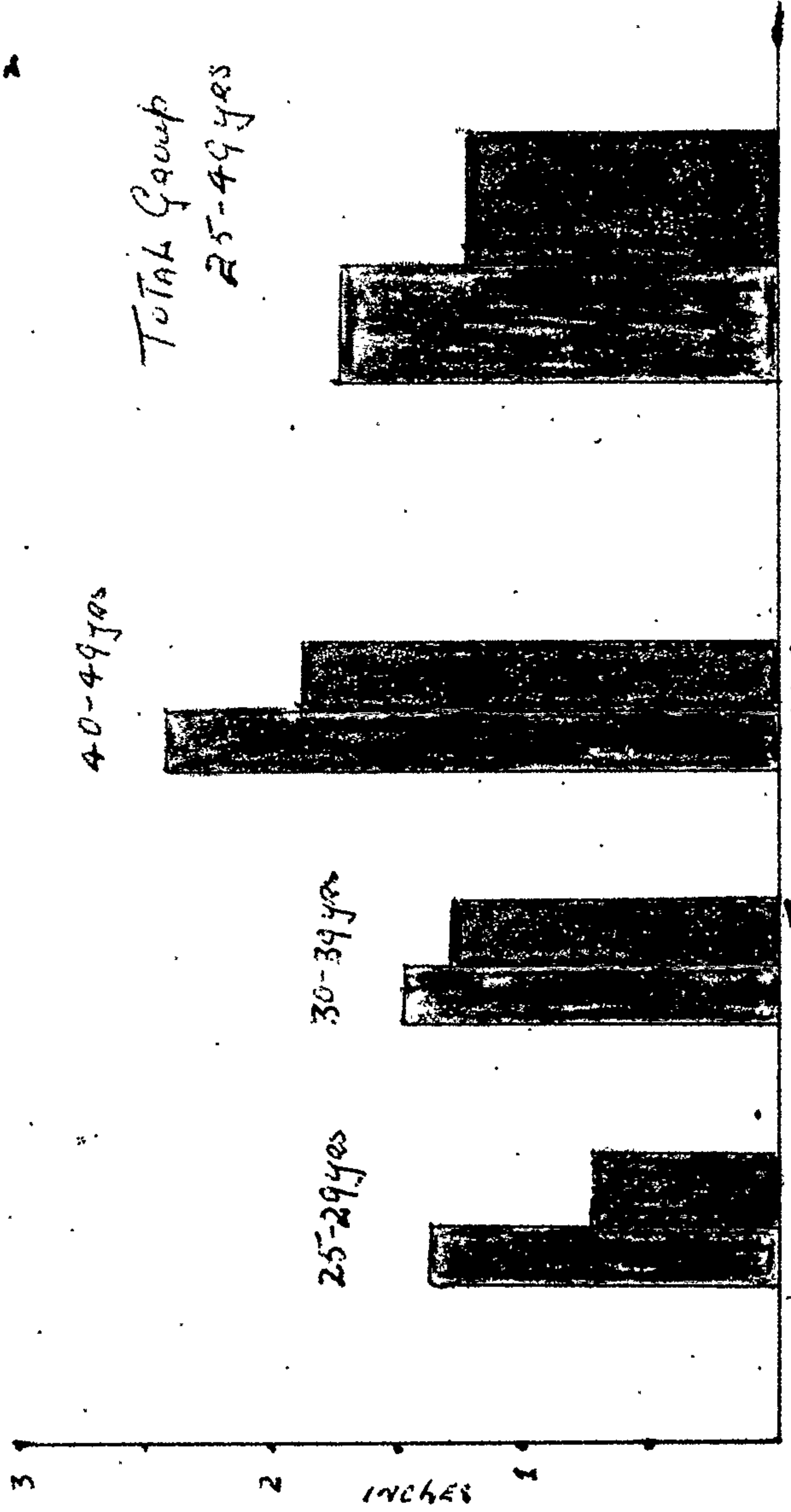


FIGURE XIV  
MEAN RUSSELL PERIODONTAL INDEX in "POOR" CONTROLLED DIABETICS  
MEAN RUSSELL PERIODONTAL INDEX in "GOOD" CONTROLLED DIABETICS

# MISSING TEETH

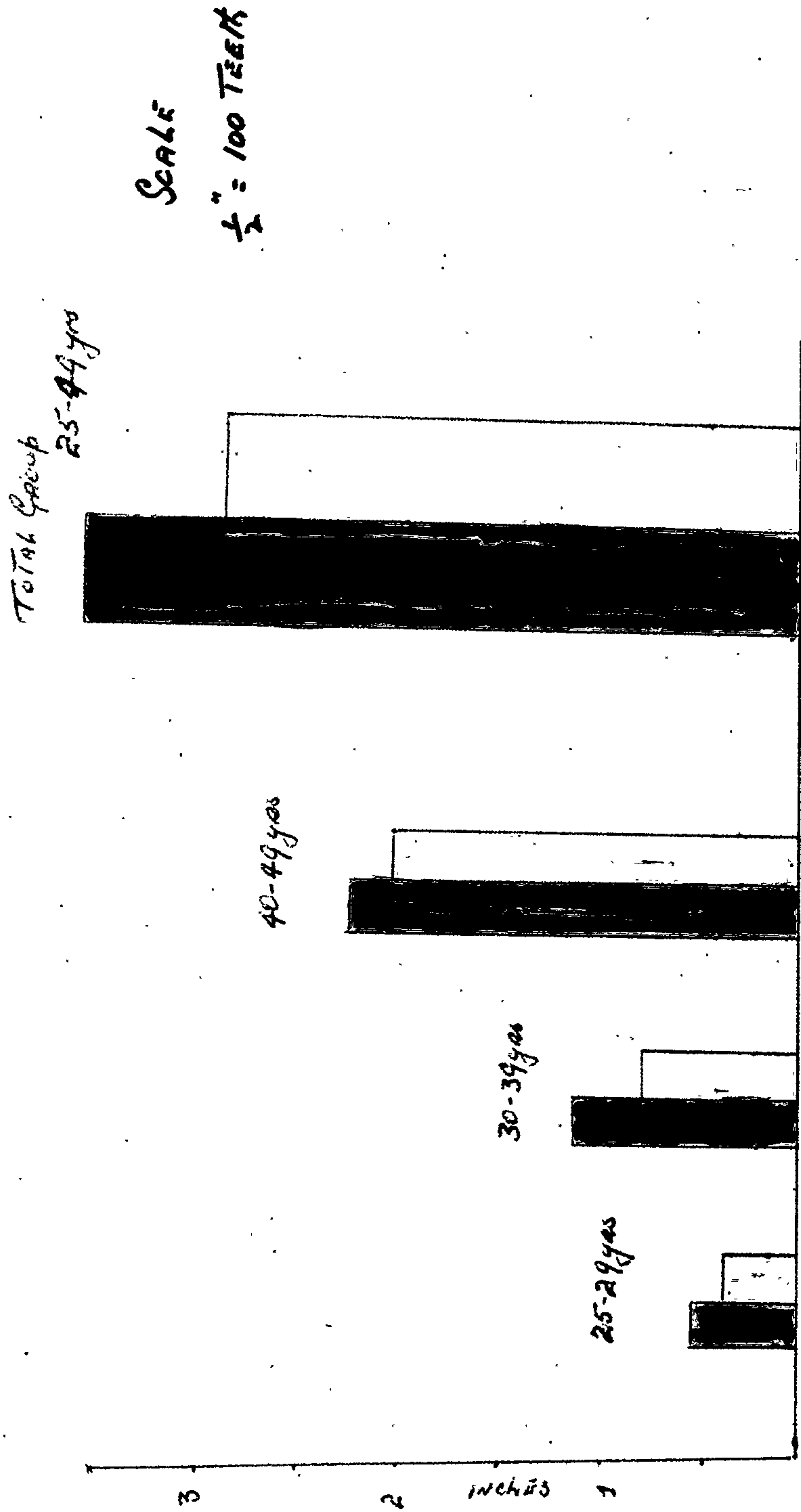


Figure XV  
 ■ MISSING TEETH IN DIABETIC GROUPS  
 □ MISSING TEETH IN NON-DIABETIC GROUPS.

# Number of Missing BreaspidS

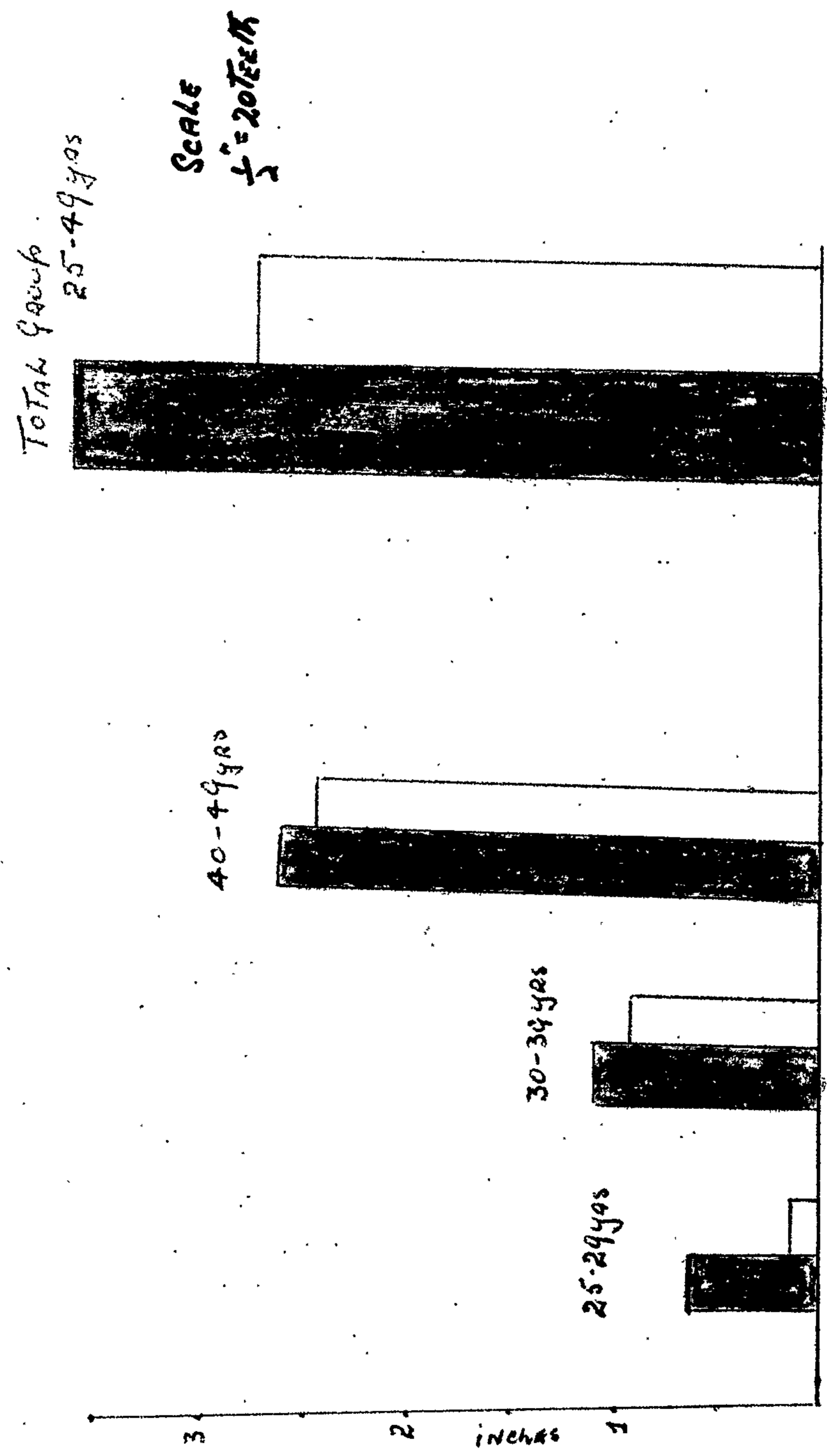


FIGURE XVI

Missing BreaspidS in Diabetics  
 Missing BreaspidS in Non-Diabetics

NUMBER OF MISSING MOLARS

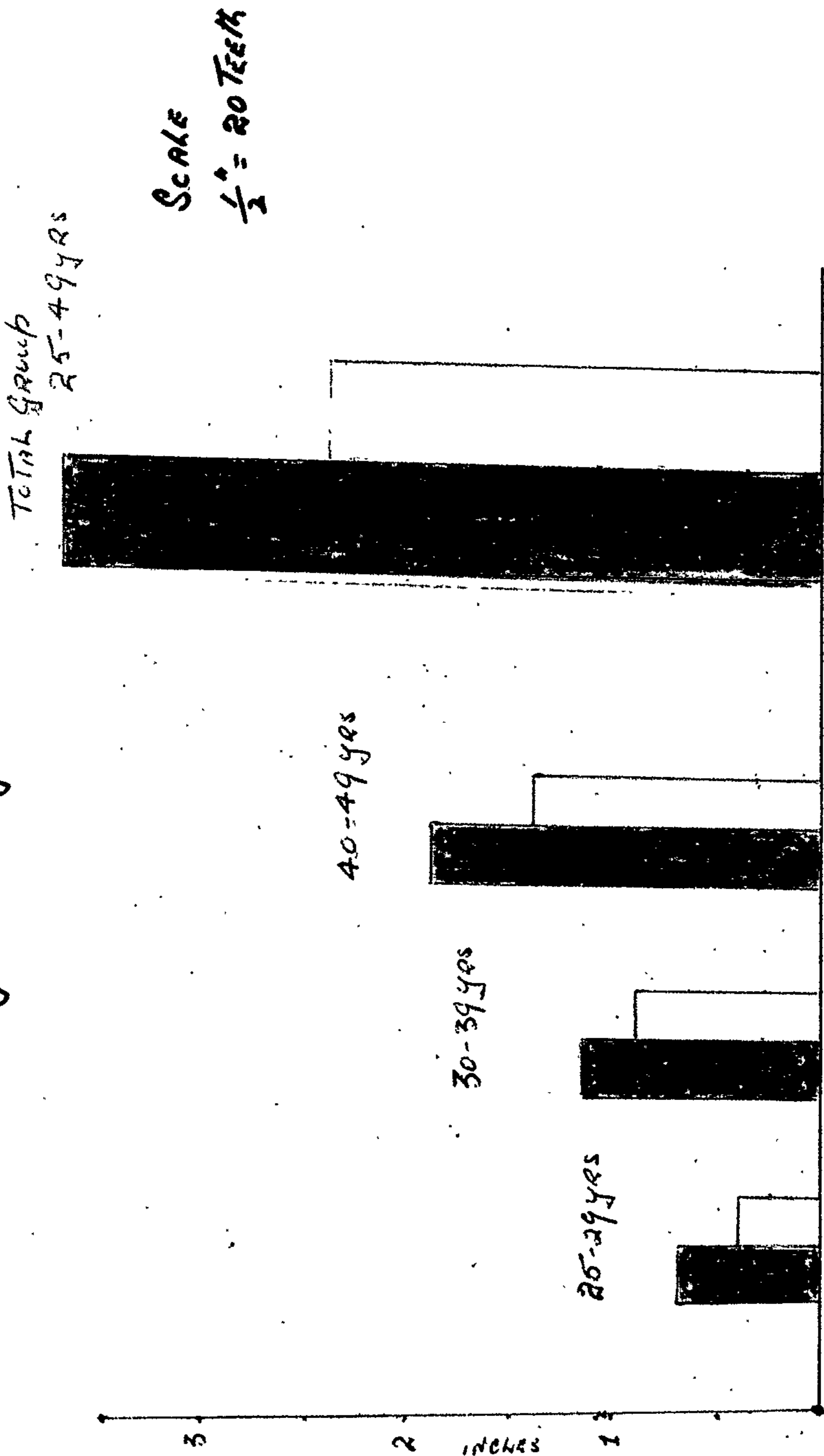


FIGURE XVII

MISSING FIRST MOLARS IN DIABETICS  
 MISSING FIRST MOLARS IN NON-DIABETICS.

SEX. MEAN RUSSELL PERIODONTAL INDEX [R.P.I.]

Scale  $\frac{1}{2}$ " = 1 unit.

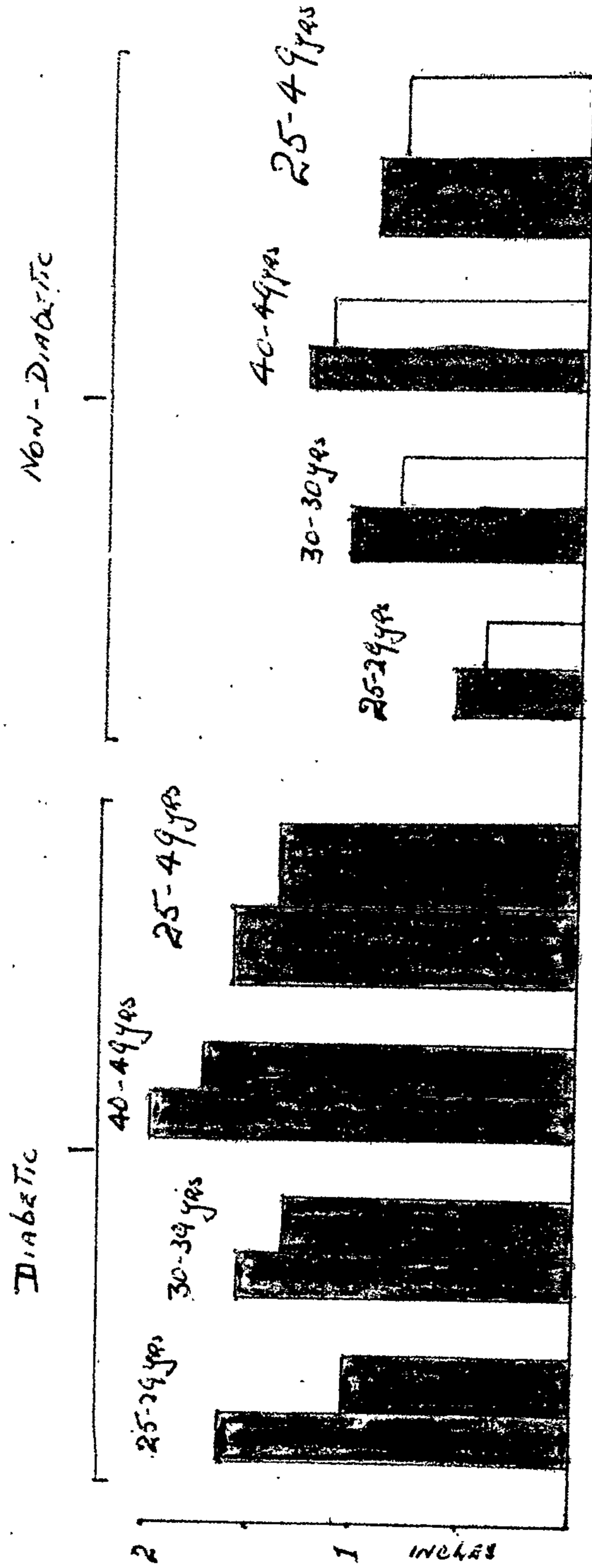


Figure XVIII

MEAN R.P.I. in MALE Diabetics
  MEAN R.P.I. in MALE Non-Diabetics  
 MEAN R.P.I. in FEMALE Diabetics
  MEAN R.P.I. in FEMALE Non-Diabetics

Tooth brushing frequency. - Russell Peridental Index

Scale  $\frac{1}{2}$ " = 1 unit.

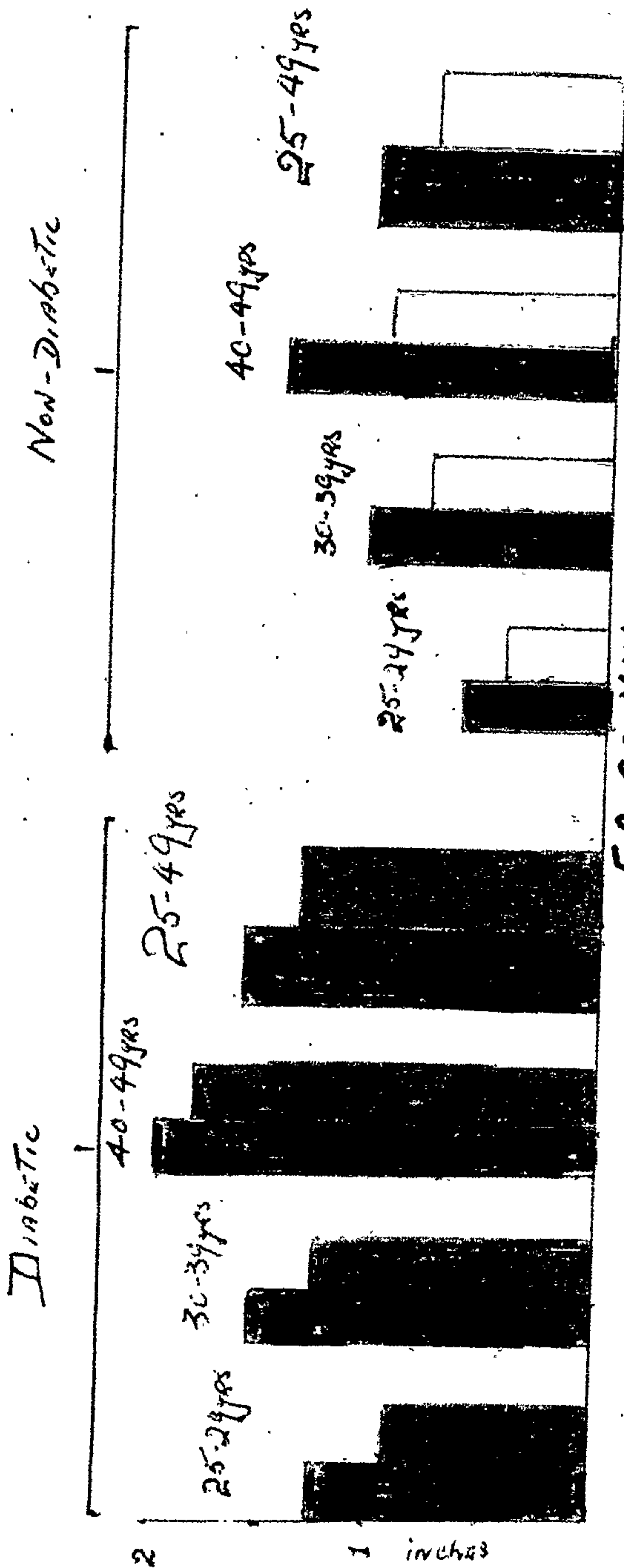


Figure XIX

MEAN R.P.I. in Diabetics with less tooth brushing    MEAN R.P.I. in Non-Diabetics in less tooth brushing  
 MEAN R.P.I. in Diabetics with more tooth brushing    MEAN R.P.I. in Non-Diabetics in more tooth brushing

Diabetic and Non-Diabetic Group.  
Tooth Brushing Frequency - Russell Peridental Index

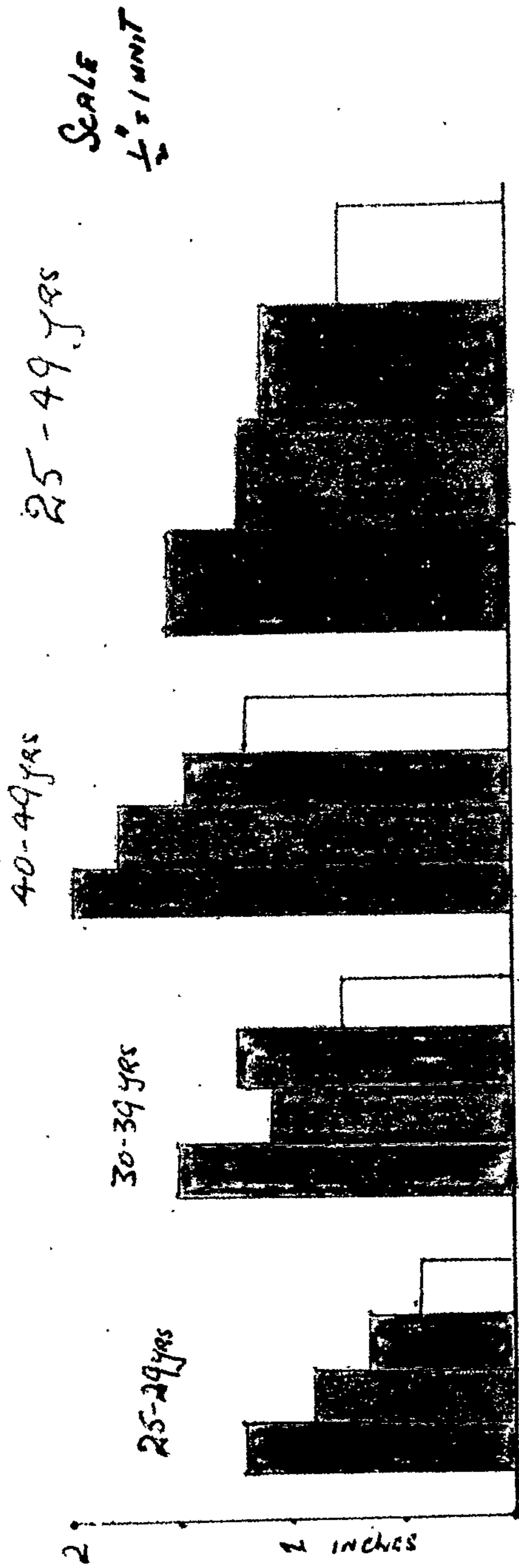


Figure XX  
 [ ■ ] MEAN R.P.I. in Diabetic Group  
 [ ● ] MEAN R.P.I. in Non-Diabetic Group  
 [ ○ ] MEAN R.P.I. in Diabetic Group  
 [ ○ ] MEAN R.P.I. in Non-Diabetic Group

Tooth-brushing 1/less per day  
 Tooth-brushing 2/more per day

Tooth brushing frequency

Debris Index Score - Non-Diabetics

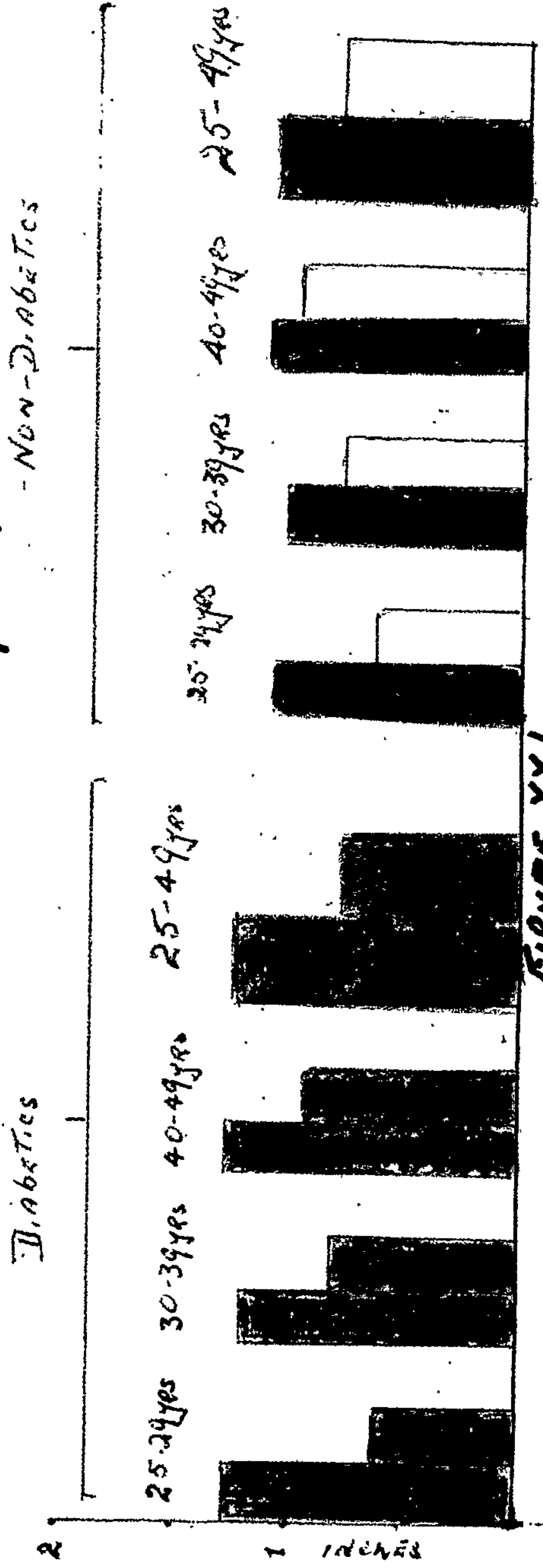


Figure XXI

Scale 1 = 1 unit

- [ ] MEAN Debris score in Diabetics with less tooth brushing per day.
- [ ] MEAN Debris score in Diabetics with more tooth brushing per day.
- [ ] MEAN Debris score in non-diabetics with less tooth brushing per day.
- [ ] MEAN Debris score in non-diabetics with more tooth brushing per day.

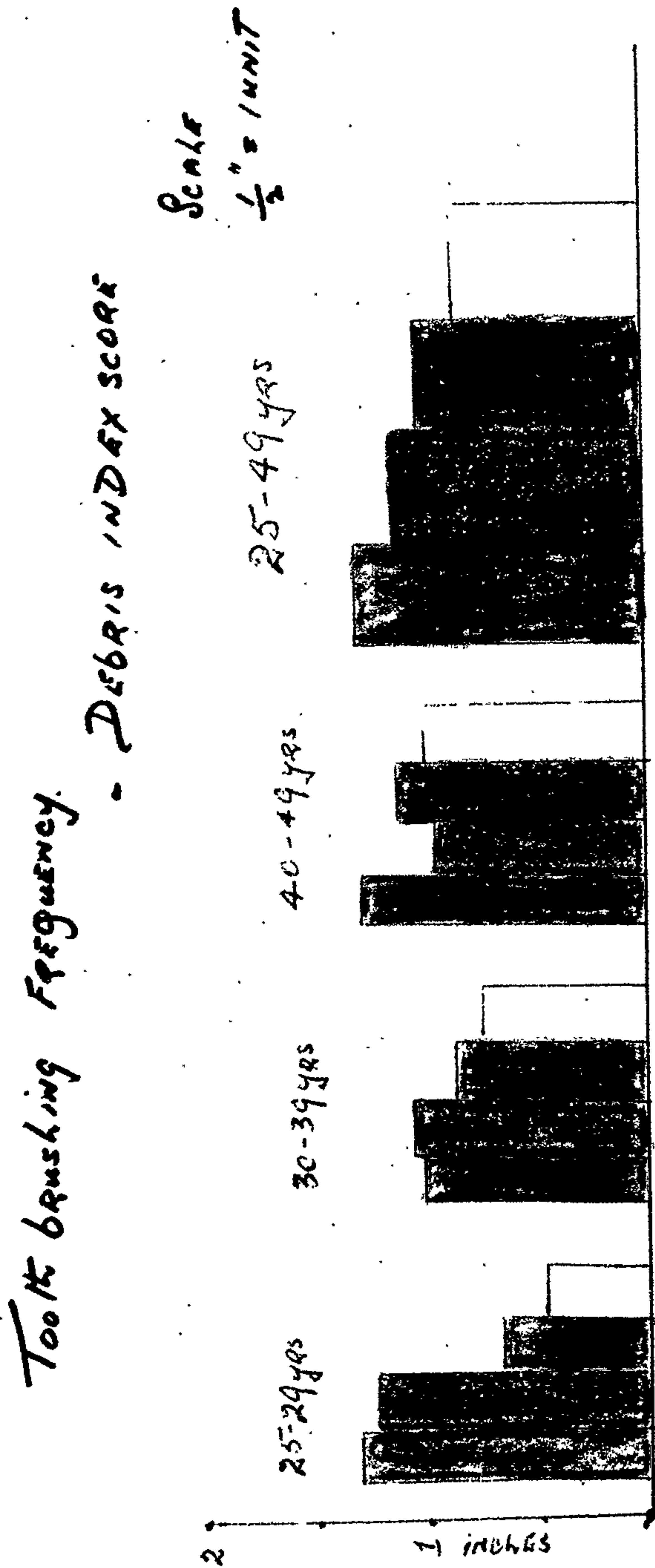


Figure XXII

Tooth brushing 1/less per day. [ ] MEAN Debris score in Diabetics  
 [ ] MEAN Debris score in Non-Diabetics

Tooth brushing 2/more per day. [ ] MEAN Debris score in Diabetics  
 [ ] MEAN Debris score in Non-Diabetics

TOOTH BRUSHING FREQUENCY.

— CALCULUS SCORE

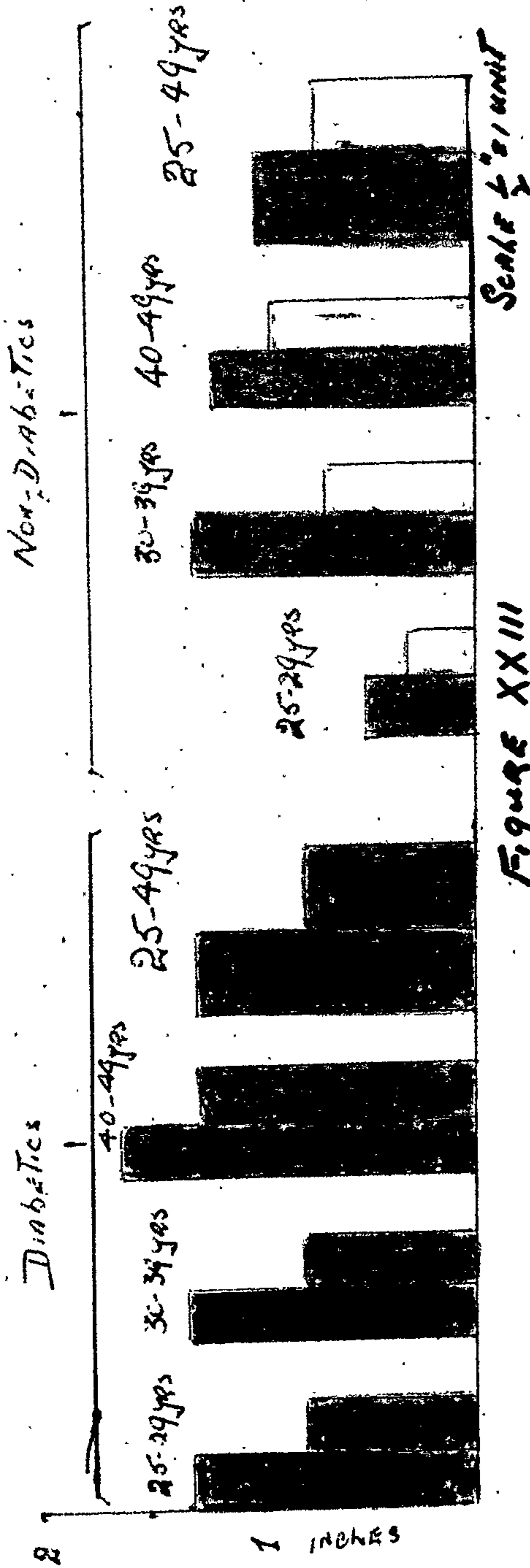


FIGURE XXIII

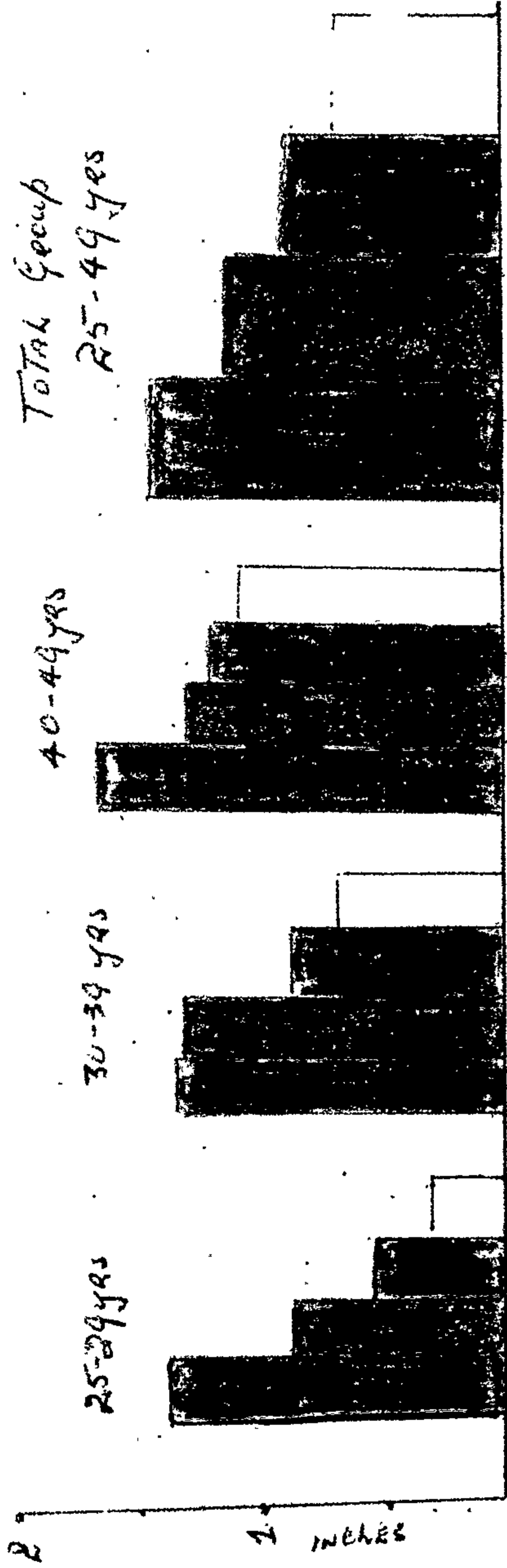
■ MEAN CALCULUS SCORE IN DIABETICS WITH LESS THAN 1 BRUSHING PER DAY.

■ MEAN CALCULUS SCORE IN DIABETICS WITH 1-2 BRUSHINGS PER DAY.

■ MEAN CALCULUS SCORE IN NON-DIABETICS WITH LESS THAN 1 BRUSHING PER DAY.

□ MEAN CALCULUS SCORE IN NON-DIABETICS WITH 2-3 BRUSHINGS PER DAY.

*Tooth brushing frequency. - Calculus Score*



*Figure XXIV*

*Scale 1/2 = 1 unit*

*Tooth brushing 1/less per day - [ MEAN CALCULUS SCORE IN DIABETICS  
MEAN CALCULUS SCORE IN NON-DIABETICS*

*Tooth brushing 2/more per day - [ MEAN CALCULUS SCORE IN DIABETICS  
MEAN CALCULUS SCORE IN NON-DIABETICS*

**Time of Examination - Mean Debris Score**

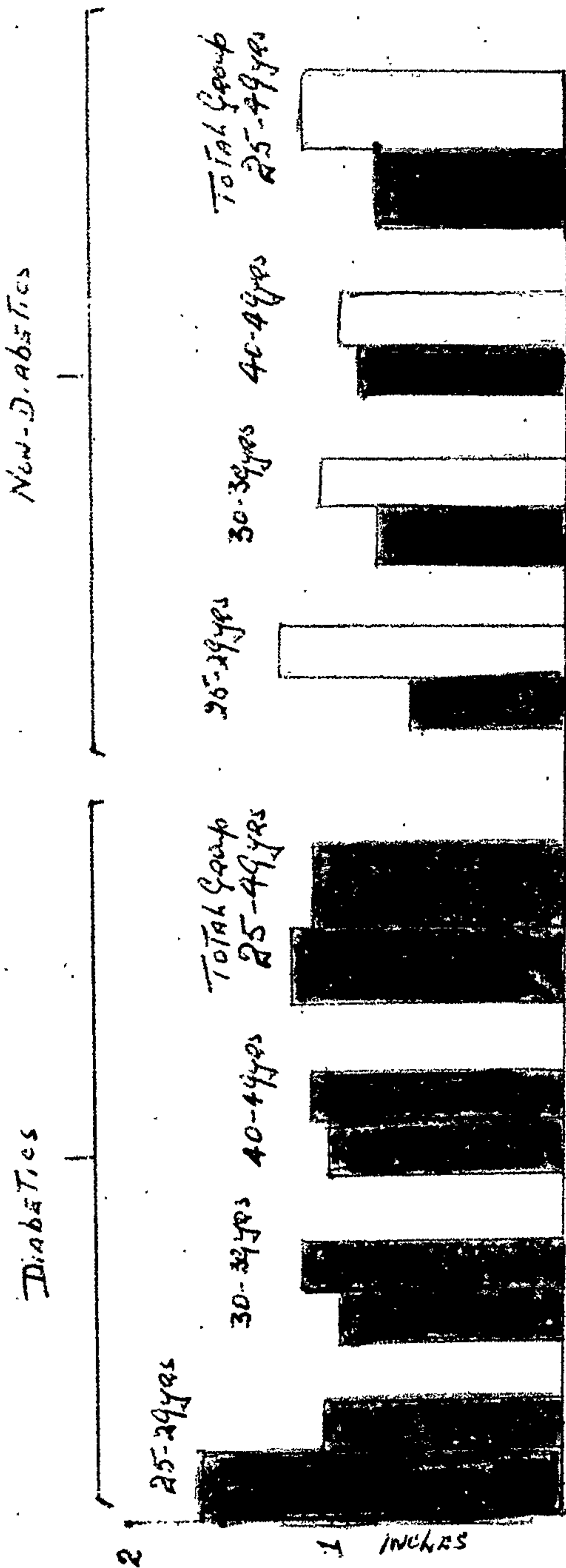


Figure XXV Scale  $\frac{1}{2}$ " = 1 unit.

○ MEAN DEBRIS SCORE IN DIABETICS EXAMINED IN THE A.M.  
 ■ MEAN DEBRIS SCORE IN DIABETICS EXAMINED IN THE P.M.

○ MEAN DEBRIS SCORE IN NON-DIABETICS EXAMINED IN THE A.M.  
 ■ MEAN DEBRIS SCORE IN NON-DIABETICS EXAMINED IN THE P.M.

Smoking - MEAN RUSSELL PERIODONTAL INDEX

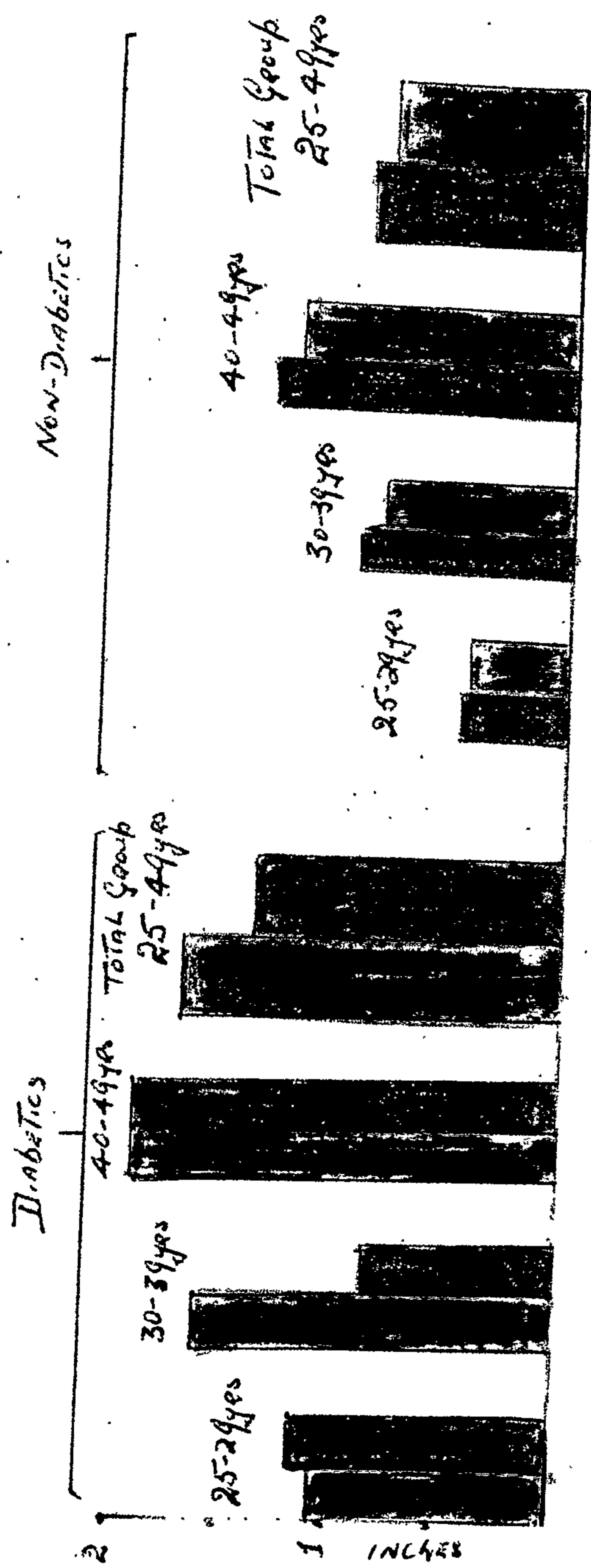


Figure XXVI  
Scale  $\frac{1}{2}$ " = 1 unit

- MEAN RUSSELL PERIODONTAL INDEX IN DIABETICS (SMOKERS)
- MEAN RUSSELL PERIODONTAL INDEX IN DIABETICS (NON-SMOKERS)
- ▨ MEAN RUSSELL PERIODONTAL INDEX IN NON-DIABETICS (SMOKERS)
- ▩ MEAN RUSSELL PERIODONTAL INDEX IN NON-DIABETICS (NON-SMOKERS)

REFERENCES

1. Aboul-El\*, L.M. Effect of diabetes on dental tissue.  
Egyptian dent. jour. 2: 64-68, July 1956.  
cited Sheridan et al. Epidemiology of  
Diabetes Mellitus: 11. A study of 100  
Dental Patients. J. of Perio.  
30.4, 298-323, Oct. 1959.
2. Allen F.M. Total Dietary Regulation in Diabetes  
Mellitus, Rockefeller Institute Mono-  
graph. cited Downie E., The Med. J. of  
Aust. 1:3, 110-113, Jan. 50th 1951.
- 2a. Albrink Margaret J. Obesity p.1164-1174. (in Beeson  
and McDermott ed, Textbook of Medicine  
W.B. Saunders Philadelphia 12th edit.  
1967. 1738 p.)
3. Amies, Geraldine C. and Park, Sybil F. A Dental Survey  
in Diabetic Children. Aust. J. of Dent.  
52:4, 233-237. July 1948.
4. Arno A., Schlof O., Lovdal A. and Vaerhaug J.  
Alveolar bone loss as a Function of  
Tobacco Consumption. Acta Odont.  
Scand. 17:1, 3-10, May 1959.

5. Ash N.M., Gitlin D.M. and Smith W.A. Correlation between  
Plaque and Gingivitis. J. of Perio.  
35:5, 424-428, Sept.-Oct. 1964.
6. Faird, W.J. Diabetes and Periodontal Disease, Dent.  
Prac. 10:6, 137-145, Feb. 1960.
7. Banting F.G. and Best C.H. Pancreatic Extracts. The J.  
of Laboratory and Clinical Med. 7:8,  
464-472, (May) 1922.
8. Barnes H.H. and Morgans M.E. Prediabetic Pregnancy.  
The J. of Obstetrics and Gynecology of  
the British Empire, 55:4, 449-454,  
August 1948.
9. Beigelman P.M. and Tranquala R.E. Serum Insulin-like  
Activity in Untreated Diabetics.  
Diabetes 11:3, 179-182, May-June 1962.
10. Belting C.M. and Gupta O.P. The influence of Psychiatric  
Disturbances on the Severity of Perio-  
dental Disease. J. of Perio. 32:3,  
219-226, July 1961.
11. Belting C.M. Hiniker J.J. and Dummett C.O. Influence of  
Diabetes Mellitus on the Severity of  
Periodontal Disease. J. of Perio. 35:6  
476-480, Nov.-Dec., 1964.

12. Bissada N.F., Schaffer E.H. and Lazarow A. Effect of Alloran Diabetes and Local Irritating Factors on Periodontal Structures of the Rat. *J.A.S.P.* 4:5, 233-240, Sept.-Oct., 1966.
13. Benjamin E.H., Russell A.L. and Smiley R.D. Periodontal Disease in Rural Children of 25 Indiana Counties. *J. of Perio.* 28:4, 294-297, Oct. 1957.
14. Benveniste R., Eirler D. and Conneally P.H. Periodontal Disease in Diabetics. *J. of Perio.* 38:4, 271-279, July-Aug., 1957.
15. Bernard C. cited Downie E. Aetiology of Diabetes Mellitus. *Med.J. of Aust.* 1:3, 110-112, Jan. 20th 1951.
16. Borson S.A. and Yalow R.S. Plasma Insulin in Health and Disease. *Amer J. of Med.* 31:5, 874-881, Nov. 1961.
17. Best C.H. Some Thoughts on the Etiology of Human Diabetes. *Canad. Med. Assn. J.* 87:14, 731-734, Oct. 1962.
18. Bondy P.K. Disorders of Carbohydrate Metabolism: Diabetes Mellitus. pp.1175-1191. (in Beeson P.B. and McDermott V., edit. *Textbook of Medicine* W.B. Saunders and Co.

Philadelphia and London. 12th ed. 1967  
(1738 pages.)

19. Bornstein J. and Laurence R.D. Plasma Insulin in Human Diabetes Mellitus. Brit. Med. J. 2: 1541-1544, Dec. 29th 1951.
20. Bose C.L. Additional Chemical Examiner Discussion on Diabetes. Brit. Med. J. 2: 1054-1056 (Oct. 19) 1907.
21. Bossert W.A. and Marks H.H. Prevalence and Characteristics of Periodontal Disease in 12,800 Persons under Periodic Dental Treatment. J.A.D.A. 52:4, 429-442, April, 1956.
22. Bouchardat A. cited Downie E., Aetiology of Diabetes Mellitus. Med. J. of Aust., 1:3, 110-112, Jan. 20th 1951.
23. Bouckaert J.P. and de Duve C. Action of Insulin. Physiological Reviews 27:1, 39-71, Jan. 1947.
24. Brandtzaeg P. and Jamison H.C. A Study in Periodontal Health and Oral Hygiene in the Norwegian Army Recruits. J. of Perio. 35:4, 302-307, July-Aug. 1964.

- 24a Brandtzaeg P. and Jamison H.C. The effect of controlled cleansing of the teeth in periodontal health, and oral hygiene in Norwegian army recruits. J. of Perio. 35:4 308-312, (July-Aug. 1964)
25. Burkot L.W. and Sindoni A. jr. Diabetes and the Dental Patient. J.A.D.A. 58:2, 81-85, Feb. 1959.
26. Burnett G.W. and Leatherwood E.C. Periodontal Disease, Oral Hygiene and Molar Attrition in Thailand. J.A.D.R., 41:372, 192, March 1963. Abstracts.
27. Camerini-Davalos R.A., Caulfield J.B., Ree S.B., Lazano-Cantanead O., Naldjian S. and Marble A. Preliminary Observations on Subjects with Prediabetes. Diabetes 12:6, 508-518, Nov.-Dec. 1963.
28. Campbell M.J.A. Gingival Changes in the Diabetic. cited Periodontal Disease in the Diabetic Patient and its treatment A.D.J. 12:2, 117-122, (April) 1967.
29. Campbell M.J.A. Periodontal Disease in the Diabetic Patient and its Treatment. A.D.J. 12:2, 117-122, (April) 1967.

30. Cawley T, cited Downie E. Aetiology  
Mellitus. Med. J. of Aust. 1:3, 110-  
112, (Jan. 20th) 1951.
31. Cheraskin E., Brunson C., Sheridan R.C. Flynn T.H.,  
Hutto A.C., Keller S.H. and Basile J.  
The Normal Glucose Tolerance Pattern:  
the Development of Blood Glucose Normal-  
ity by Analysis of Oral Symptoms. J. of  
Perio. 31:2, 123-137, (April) 1960.
32. Cheraskin E., Brunson C. and Goodwin J.D. Normal glucose  
Tolerance pattern: Development of Blood  
Glucose Normality by Analysis of Extra-  
oral Symptoms. J. of Perio. 31:3,  
197-206, (July) 1960.
33. Cheraskin E. Relationship of Cortisone-Glucose Tolerance  
Test to Periodontal Diseases. Symposium  
on Diabetes as Reported by Max B. Winslow.  
J. of Perio. 35:1, 86, (Jan.-Feb.) 1964.
34. Cheraskin E. and Ringsdorf U.M. Jr. Gingival State and  
Carbohydrate Metabolism. J. of Dent. Res.,  
44:3, 480-486, (May-June) 1964.
35. Cohen M.M., Shklar G. and Yerganin G. Periodontal and  
Pulpal Pathology in a Strain of Chinese  
Hamsters with Hereditary Diabetes Mellitus.

O.S., O.H., O.P. 16:1, 104-112, (Jan.)  
1963.

36. Congalton A.A. in assn. with Steadman R.G. and Beehag, J. Status Rating of Sydney Suburbs, Uni. of N.S.W. Kensington 1961 89 pp. (p.81-90).
37. Congalton A.A. Social Status of Occupations in Sydney. Univ. of N.S.W. Kensington 1962 83 pp. (p.74-79).
38. Conn J.V., Louis L.H. and Wheeler C.E. Production of Temporary Diabetes Mellitus in Man with Adrenocorticotrophic Hormone; Relation to Uric Acid Metabolism. J. of Laboratory and Clinical Medicine. 33:6, 651-661, (June) 1948.
39. Conn J.V., and Fajans S.S. The Prediabetic State: A concept of Dynamic Resistance to a Genetic Diabetogenic Influence. Amer.J. of Med. 31:6, 839-850, (Dec.) 1961.
40. Comroe B.I., Collins L.H., and Crane M.P. Internal Medicine in Dental Practice. Lea and Febiger Philadelphia 4th Edit. 1954 pp. (p.263-278).

41. Cori C.F. Enzymatic Reactions in Carbohydrate Metabolism. Harvey Lectures, 1947 cited Downie E. Aetiology of Diabetes Mellitus. Med.J. of Aust. 1:3 110-112 (Jan.20th) 1951.
42. Cullen W. cited Downie E. Aetiology of Diabetes Mellitus. Med. J. of Aust. 1:3, 110-112 (Jan.20th.)1951.
43. Dinguizli R. cited Downie E. Aetiology of Diabetes Mellitus. Med. J. of Aust. 1:3, 110-112, (Jan. 20th) 1951.
44. Ditzel J., White P. and Duckor J. Changes in the Pattern of the smaller Blood Vessels in the Bulbar Conjunctiva in Children of Diabetic Mothers: A Preliminary Report. Diabetes 3:2 99-106, (March-April) 1954.
45. Ditzel J. and Sagild U. Morphologic and Hemodynamic changes in the smaller blood vessels in Diabetes Mellitus. New Eng. J. of Med. 250:14, 586-594, (April 8th) 1954.
46. Dobson H. Medical Observations and Inquiries. cited Downie E. Aetiology of Diabetes Mellitus. Med.J. of Aust. 1:3,110-112,(Jan.20)1951.
47. Downie E. Diabetic Gangrene. The Aust. and New Zealand Jour. of Surgery.1:4,393-403, (March)1932.

48. Downie E. Aetiology of Diabetes Mellitus. Med. J. of Aust. 1:3, 110-112, (Jan. 20th) 1951.
49. Dunn J.S., Sheehan H.L. and McLetchie N.G.R.  
Necrosis of Islets of Langerhans produced experimentally. The Lancet. 1:16, 484-487, (April 17th) 1943.
50. Englander H.R. and White C.I. Periodontal and Oral Hygiene Status of Teenagers in Optimum and Fluoride deficient Cities. J.A.D.A. 68:2, 173-177, (Feb.) 1964.
51. Ensinck J. and Owen-Vallance J. The Program of the 23rd Annual Meeting of the American Diabetes Assn. cited Levine R. Arch. of Path. 78:10, 405-408. (Oct.) 1964.
52. Balta W. cited Downie E. Aetiology of Diabetes Mellitus Med. J. of Aust. 1:3, 110-112, (Jan. 20th) 1951.
53. Fletcher R.F. Lecture Notes on Endocrinology. Blackwell Scientific Publication, Oxford. 1967. 277 pp. (p. 61-91).
- 53a. Forsham P.H. Renold A.E. and Thorn G.V. Diabetes Mellitus Chapt. 70, p. 635. (in Harrison T.R. ed. Principles of Internal Medicine McGraw-Hill New York. 4th Edit. 1962 1947p.

54. Frandsen A. and Pindborg J.J. Tobacco and Gingivitis  
 III. Difference in the Action of  
 Cigarette and Pipe Smoking. J. Dent. Res.  
 28:5, 464-465, (Oct.) 1949.
55. Freeman H.L., Williams C.H.M. and Grainger R.M.  
 Prevalence and Severity of Periodontal  
 Disease. J. Canad. D.A. 31:12, 779-786,  
 (Dec.) 1965.
56. Galen cited Downie E. Aetiology of Diabetes Mellitus  
 Med. J. of Aust. 1:3, 110-112, (Jan. 20th)  
 1951.
57. Gepts W. cited Warren S., Le Compte P.H. and Legg M.A.  
 Pathology of Diabetes Mellitus. Lea and  
 Febiger, Philadelphia. 4th Edit. 1966  
 528 pp. (p.11)
58. Glickman I. The Periodontal Structures in Experimental  
 Diabetes. New York J. of Dent. 16:6,  
 226-251, (June-July) 1946.
- 58a. Glickman I. Clinical Periodontology V, B. Saunders Co.,  
 Philadelphia and London 2nd Edit. 1958,  
 978 pp. (p.12-38).
59. Glickman I. Clinical Periodontology. W. B. Saunders and  
 Co. Philadelphia and London. 3rd edit.  
 1964, 902 pp. (p.340-343).

60. Goldman H.M. and Cohen D.V. Periodontia. C.V.Mosby  
St.Louis 4th edit. 1957 353 pp.  
(p.319-320.)
61. Golomb Ida N. An Evaluation of the Relation of  
Diabetes Mellitus in Periodontal  
Disease. New York Dent.J. 15:9, 525-528,  
(Nov.) 1949.
62. Gordon E.S. Diabetic Vascular Disease. J.Dent.Med.17:1,  
14-15 (Jan.)1962.
63. Gottsogen R. Dental and Oral Considerations in Diabetes  
Mellitus. New York. State J.of Med.62:3,  
389-395, (Feb.1) 1962.
64. Gottsogen R. Relationship of Diabetes and Periodontal  
Disease. Symposium on Diabetes as re-  
ported by Max B.Winslow. J. of Perio.,  
35:1, 86, (Jan.-Feb.) 1964.
65. Grant D., Stern I.D. and Everett F.G. Orban's Perio-  
dontics. C.V.Mosby St.Louis 2nd edit.  
1963. 591 pp. (p.60-65).
- 65a Grant D., Stern I.D. and Everett F.G. Orban's Perio-  
dontics. C.V.Mosby St.Louis 2nd edit.  
1963. 591 pp. (p.23).

- 65b Grant D., Stern I.B. and Everett F.G. Urban's Periodontics. C.V.Mosby St.Louis 2nd edit. 1963. 591 pp. (p.49)
66. Greene, J.C. Periodontal Disease in India: Report of an Epidemiological Study. J.Dent. Res. 39:2, 302-312, (March-April) 1960.
67. Greene J.C. and Vermillion J.R. The Oral Hygiene Status. J.A.D.A. 61:2, 172-179, (August) 1960.
68. Greene J.C. Oral Hygiene and Periodontal Disease. Am.J.Health 53:6, 913-922, (June) 1963.
69. Haist R.E., Campbell J. and Best C.H. The Prevention of Diabetes. The New Eng.J. of Med. 223:16 607-615, (Oct.17th) 1940.
70. Harding Burns. Physician at Royal Prince Alfred Hospital. Diabetes Mellitus. Lecture to New South Wales Society of Periodontology and personal communication. 1968.
71. Harris. R. Periodontal Disease in a Group of School Children in Thailand. Aust.Dent.J. 6:3 151-158, (June) 1961.
72. Himsworth H.P. Dietetic Factor Determining Glucose Tolerance and Sensitivity to Insulin of Healthy men. Clinical Science 2:1, 67-94, (Sept.) 1935.

73. Hinaworth H.P. The Syndrome of Diabetes Mellitus and its cause. *The Lancet* 1: 465-470, (March 19th) 1949.
74. Houssay B.A., Lewis J.T. and Foglia V.C. Effet des injections continue d'insuline chez le chien depancreatee compte. *Rend. Soc. de Biol.* 102: 241-245, May 1929 cited Downie E. *Aetiology of Diabetes Mellitus Med. J. of Aust.* 1:3, 110-112, (Jan. 20th) 1951.
75. Houssay B.A. Thyroid and Metathyroid diabetes *Endocrinology* 35:4, 158-172, (Sept.) 1944.
76. Ingle D.J., Sheppard R., Kuizenga H., and Evans J.S. Comparison of Adrenal Steroid Diabetes and Pancreatic Diabetes in Rats. *Endocrinology.* 37:5, 341-356, (Nov.) 1945.
77. Jackson V.P.U. Present Status of Prediabetes. *Diabetes.* 9:5, 373-356, (Sept.-Oct.) 1960.
- 77a Jackson V.P.U. Prediabetes. *Postgrad. Med. J.* 35:403, 287-296, (May) 1959.
78. Jacobs H.R. Hypoglycemic action of Alloxan. *Proc. Soc. Exper. Biol. and Med.* 37:5, 407-409, (Nov.) 1937.

79. Joslin E.P., Root H.F. White Prisco, Marble A., and  
Egley C.C. The Treatment of Diabetes  
Mellitus. Lea and Febiger Philadelphia,  
8th edit, 1946, 861 pp. (p.68-75)
80. Katzen H. and Stetten D.W.Jr. Hepatic-glutathione-  
insulin Transhydrogenase. Diabetes 11:4,  
271-280, (July-Aug.) 1962.
81. Kerr D. Relations between Periodontal Disease and  
Systemic Disease. J.Dent.Res. 41:1  
supp., 302-305, (Jan-Feb.) 1962.
82. Ladaivalyo H.R.H. and Harris R. A Study of the Gingival  
and Periodontal Conditions of a Group  
of People in Chiang Mai Province. J. of  
Perio. 30:3, 210-222, (July) 1959.
83. Langerhans P. cited Downie E. Aetiology of Diabetes  
Mellitus. Med.J. of Aust. 1:3,110-112,  
(Jan 20th) 1951.
84. Lawrence R.D. Lipodystrophy and Hepatomegaly with  
Diabetes, Lipemia and other Metabolic  
Disturbances: Case Throwing New Light  
on the Action of Insulin. The Lancet,  
1:19, 724-731, (May 18th) 1946.
85. Le Compto P.H. Vascular Lesions in Diabetes Mellitus.  
J.Chronic Diseases 2:2,178-219(Aug.)1955.

86. Levino H.L. Some Dental Aspects of Endocrine Disease.  
O.S., O.H. and O.P. 19:4, 473-474,  
(April) 1965.
87. Levino Rachmiel. History of Etiology of Diabetes  
Mellitus. Archives of Pathology, 78:10,  
405-408, (Oct.) 1964.
88. Loe H. Periodontal Changes in Pregnancy. J. of Perio.  
36:3, 209-217, (May-June) 1965.
89. Lovdal A., Arno A. and Waerhaug J. Incidence of  
Clinical Manifestations of Periodontal  
Disease in Light of Oral Hygiene and  
Calculus Formations. J.A.D.A. 56:1,  
22-33, (Jan.) 1958.
90. Lovdal A., Schei G., Waerhaug J. and Arno A. Tooth  
Mobility and Alveolar Bone Resorption  
as a Function of Occlusal Stress and  
Oral Hygiene. Act. Odont. Scant. 17:1,  
61-77, (May) 1959.
91. Lovstedt S.A. and Austing L.F. Periodontoclasia in  
Diabetes Mellitus. J.A.D.A. 30:3,  
273-274, (Feb.) 1943.
92. Lukens F.D.W., Dohan F.C. and Wolcott M.W. Pituitary  
Diabetes in Cat; Recovery Following Phlor-  
hizin Treatment. Endocrinology 32:6,  
475-487, (June) 1943.

93. McCarthy P.L. and Shklar G. Disease of the Oral Mucosa. McGraw-Hill. N.Y., Toronto, Lond., 1964. 373 pp. (p.248-250).
94. McMullen J.A., Legg M., Gottsegen R. and Camerini-Davalos R. Microangiopathy Within the Gingival Tissues of Diabetic Subjects with Special Reference to the Prediabetic State. J.A.S.P. 5:2, 61-69, (March-April) 1967.
95. Mackenzie R.S. and Millard H.D. Interrelated Effects of Diabetes, Arteriosclerosis and Calculus on Alveolar Bone Loss. J.A.D.A. 66:2, 191-198, (Feb.) 1963.
96. Marble A. Diabetes Mellitus: Its Relation to Oral Pathosis. A Symposium. Pathological Changes in Extra-Oral Tissues. J. of Perio. 18:4, 151-155, (Oct.) 1947.
97. Marshall-Day C.D. and Shouric K.L. A Roentgenographic Survey of Periodontal Disease in India. J.A.D.A. 39:5, 572-588, (Nov.) 1949.
98. Marshall-Day C.D., Stephens R.G. and Quigley L.F.Jr. Periodontal Disease: Prevalence and Incidence. J. of Perio., 26:3, 185-203 (July) 1955.

99. Martinez E. Diabetes in Dental Practice. Dental Abstracts 1:3, 178, (March) 1956.
100. Mering J. Von and Minkowski O. cited Levine R. History of Etiology of Diabetes Mellitus. Arch. of Path. 78:10, 405-408, (Oct.) 1964.
101. Miller A.M. and Douglas B.I. Detection of Diabetes in Geriatric Dental Patients J.A.D.A. 11:1, 78-80, (July) 1965.
102. Mirsky I.A. Some Considerations of Etiology in Diabetes Mellitus in Man. Proc. of Amer. Diab. Assn. cited Levine R. History of Etiology of Diabetes Mellitus. Arch. of Path. 78:10, 405-408, (Oct.) 1964.
103. Mirsky I.A. and Perisutti G. The Relative Specificity of Insulinase Activity of Rat Liver Extracts. J. Biol. Chem., 228:1, 77-83, (Sept.) 1957.
104. Mobley E. and Smith S.H. Some Social and Economic Factors Relating to Periodontal Disease Among Young Negroes, No. 1. J.A.D.A. 66:4, 486-491, (April) 1963.
105. Moore R.M., Muhler J.C. and McDonald R.E. Study on the Effect of Water Fluoride Content and Socio-Economic Status on the Occurrence of Gingivitis in School Children. J. Dent. Res. 43:5, Abstr. 782-783, (Sep.-Oct.) 1964.

106. Horton cited Downie E. Aetiology of Diabetes Mellitus  
Med. J. of Aust. 1:3, 110-112, Jan. 20th)  
1951.
107. Mesenthal H.O. and Barry Eileen. Criteria for and  
Interruption of Normal Glucose Tolerance  
Tests. Ann. of Amer. Med. Assn. 33:5,  
1175-1194, (Nov.) 1950.
108. Newburgh L.H. and Conn J.W. New Interpretation of  
Hyperglycemia in Obese Middle-Aged  
Persons. Jour. of Amer. Med. Assn.  
112:1, 7-10, (Jan. 7th) 1939.
109. Ogilvie R.F. Aetiology of Diabetes Mellitus and its  
Complications, cited Warren S., Le Compte  
P.H. and Legg M. Pathology of Diabetes  
Mellitus. Lea and Febiger. Philadelphia.  
4th edit. 1966 528 pp. (p.15).
110. O'Leary T.J. Shannon I.L. and Prigmore J.R. Clinical and  
Systemic Findings in Periodontal Disease.  
J. of Perio. 33:3, 243-251, (July) 1962.
111. Opie D.L. cited Downie E. Aetiology of Diabetes Mellitus.  
Med. J. of Aust. 1:3, 110-112, (Jan. 20th)  
1951.

112. Parfitt G.J. A Survey of the Oral Health of Navajo Indian Children. Arch. Oral Biol. 1:3, 193-205, (Jan) 1960.
113. Person P. Some Aspects of Bone Metabolism of the Maxilla and Mandible. N.Y. State Dent. J. 23:4, 165-170, (April) 1957.
114. Pindborg J.J. Tobacco and Gingivitis I. J. Dent. Res. 26:3, 261-264, (June) 1947.
115. Pindborg J.J. Tobacco and Gingivitis II. Correlation between Consumption of Tobacco, Ulceromembranous Gingivitis and Calculus. J. Dent. Res. 28:5, 460-463, (Oct.) 1949.
116. Pollack H., Person P, and Knishkowsky E. Oral Lesions seen in Diabetes Mellitus. J. of Perio. 18:4, 155-158, (Oct.) 1947.
117. Ramfjord S.P. Periodontal Status in Boys 11 to 17 years old in Bombay, India. J. of Perio. 32:3, 237-248, (July) 1961.
118. Ramfjord S.P., Kerr D.A. and Ash M. World Workshop in Periodontics, Univ. of Michigan 1966 458 pp. (p.197).
119. Ramfjord S.P., Kerr D.A. and Ash M. World Workshop in Periodontics, Univ. of Michigan 1966 458 pp. (p.11-46).

120. Ray H.G. A Study of Histopathology of the Gingiva in Patients with Diabetes Mellitus. J. of Perio. 19:4, 128-130, (Oct.) 1948.
121. Ray H.G. and Orban B. The Gingival Structures in Diabetes Mellitus. J. of Perio. 21:2, 85-95, (April) 1950.
122. Rifkin H. Clinical Diabetes Mellitus. Symposium as reported by Max. B. Winslow. J. of Perio. 35:1, 86-87, (Jan.-Feb.) 1964.
123. Rockey E.W. Total Pancreatectomy for Carcinoma. Case Report. Annals of Surgery. 118: 603-611, (Oct.) 1943.
124. Rose H.P., Kuna A. and Kraft E. Systemic Manifestations of Periodontal Disease. J. of Perio. 34:3, 253-255, (May) 1963.
125. Rudy A. and Cohen H.N. Oral Aspects of Diabetes Mellitus J. of A.D.A. 29:4, 523-534, (April) 1942.
126. Russell A.L. A System of Classification and Scoring for Prevalence Surveys of Periodontal Disease. J.Dent. Res. 35:3, 350-359, (June) 1956.

127. Russell A.L. Some Epidemiological Characteristics of Periodontal Disease in a Series of Urban Populations. *J. of Perio.* 28:4, 286-295, (Oct.) 1957.
128. Russell A.L. A Social Factor Associated with the Severity of Periodontal Disease. *J. of Dent. Res.* 36:6, 922-926, (Dec.) 1957.
129. Russell A.L. and Ayers P. Periodontal Disease and Socio-Economic Status in Birmingham, Alabama. *Am. J. Pub. Health.* 50:2, pt.1 206-214, (Feb.) 1960.
130. Russell A.L., Consolazione C.F. and White C.L. Periodontal Disease and Nutrition in Eskimo Scouts of Alaska National Guard. *J. of Dent. Res.* 40:3, 604-613, (May-June) 1961.
131. Russell A.L. International Nutritional Surveys: A Summary of Preliminary Findings. *J. of Dent. Res.* 42:1 supp., 233-244, (Jan.-Feb.) 1963.
- 131a Russell A.L. The Periodontal Index. *J. of Perio.* 38:6, 585-591, (Nov.-Dec.) 1967.

132. Rutledge C.E. Oral and Roentgenographic Aspects of the Teeth and Jaws of Juvenile Diabetics. J.A.D.A. 27:11, 1740-1749, (Nov.) 1940.
133. Sandler H.C. and Stahl S.S. The Influence of Generalized Disease on Clinical Manifestations of Periodontal Disease. J.A.D.A. 49:6, 656-667, (Dec.) 1954.
134. Sandler H.C. and Stahl S.S. Prevalence of Periodontal Disease in a Hospitalized Population. J. of Dent. Res. 39:3, 439-449, (May-June) 1960.
135. Schallhorn R.G. Literature Review: Diabetes Mellitus and Periodontal Disease. Periodontal Abstracts. 14:1, 9-11, (March) 1966.
136. Schei O., Waerhaug J., Lovdal A. and Arno A. Alveolar Bone Loss as Related to Oral Hygiene and Age. J. of Perio. 30:1, 7-16, (Jan.) 1959.
137. Schour I. and Massler M. Endocrines and Dentistry Part III. J.A.D.A. 30:6, 943-950, (June) 1943.

138. Schnee E. Diabetes: Its Causes and Permanent Cure.  
Translated by R.I. Tafel. cited Downie  
E. Aetiology of Diabetes Mellitus. Med.  
J. of Aust. 1:3, 110-112, (Jan. 20th)  
1951.
- 138a Schultz-Hardt, Sig. D. Anatomy and Physiology of the  
Periodontal Structures - Review of the  
literature p.12-46 (in Ramfjord, S.P.  
Kerr, D.A. and Ash, M., edits. World  
Workshop in Periodontics. 1966.  
(454 pages).
139. Scott D.A. and Fidler A.M. Insulin and Zinc Content  
of Normal and Diabetic Pancreas. J. of  
Clin. Investigation 17:6, 725-728, (Nov.)  
1938.
140. Seeman Sybil K. Study of the Relationship between  
Periodontal Disease and the Wearing of  
Partial Dentures. Aust. D.J. 8:3,  
206-208, (June) 1963.
141. Shannon I.L. and Gibson W.A. Periodontal Status and  
Glucose Tolerance. J. Dent. Res. 44:1,  
28-32, (Jan.-Feb.) 1965.

142. Sharkey T.P. Recent Research Developments in Diabetes Mellitus, Part 1. J. of Amer. Diab. Ass. 48:4, 281-287, (Oct.) 1966.
143. Sheppard I.M. Oral Manifestations of Diabetes Mellitus, A Study of 100 Cases. J.A.D.A. 29:9, 1188-1192, (July) 1942.
144. Shepro H.J. Oral Manifestations of Metabolic Disturbances. J.A.D.A. 43:5, 543-555, (Nov.) 1951.
145. Sheridan R.C. Jr., Cheraskin E., Flynn F.H., and Hutto A.C. Epidemiology of Diabetes Mellitus. II. A Study of 100 Dental Patients. J. of Perio. 30:4, 298-323, (Oct.) 1959.
146. Shklar G., Cohen M.M. and Yerganian G. A Histopathologic Study of Periodontal Disease in the Hamster with Hereditary Diabetes. J. of Perio. 33:1, 14-21, (Jan.) 1962.
147. Shklar G. Periodontal Disease in the Diabetic Chinese Hamster. Symposium of Diabetes Mellitus as reported by Max B. Winslow. J. of Perio. 35:1, 87 (Jan.-Feb.) 1964.

- 147a. Sicher H. Orban's Oral Histology and Embryology.  
C.V.Mosby Co., St.Louis 5th Edit. 1962.  
406 pp. (p.185).
148. Sindoni A., Jr. The Diabetic Dental Patient. The Dent.  
Clin.of Nth.Amer. 459-469, (July) 1958.
149. Soskin S., Essex H.E., Herrick J.F. and Mann F.C.  
Mechanism of Regulation of Blood Sugar by  
the Liver. Amer.J. of Physiol. 123:2,  
558-567, (Nov.) 1938.
150. Smelo L.S. Proceedings of the American Diabetic Assn.  
cited Downie E. Aetiology of Diabetes  
Mellitus. Mod.J. of Aust. 1:3, 110-112,  
(Jan.20th) 1951.
151. Stahl S. Roentgenographic and Bacteriologic Aspects  
of Periodontal Changes in Diabetes. J.  
of Perio. 19:4, 130-132, (Oct.) 1948.
152. Stahl S.S., Wisan J.M. and Miller S.S. The Influence  
of Systemic Disease on Alveolar Bone.  
J.A.D.A. 43:3, 277-283, (Sept.) 1952.
153. Stahl S.S. and Morris A.L. Oral Health Conditions  
among Army Personnel at the Army  
Engineering Centre. J. of Perio. 26:3,  
180-185, (July) 1955.

154. Stahl S.S. Witkin G.J. and Scopp I.V. Degenerative Vascular changes observed in selected Gingival Specimens. O.S., O.M. and O.P. 15:12, 1495-1504, (Dec.) 1962.
- 154a Stanmeyer W. A Measure of Tissue Response to Frequency of Toothbrushing. J. of Perio. 28:1, 17-22 (Jan.) 1957.
155. Stoinke J., Soeldner J.S. and Renold A.E. Studies on serum insulin-like activity (I.L.A.) in Prediabetes and early overt Diabetes. Diabetes. 12:6, 502-507, (Nov.Dec.) 1963.
156. Svenson I.M. Alveolar Bone Resorption associated with Diabetes. J. of Perio. 25:1, 52-53, (Jan.) 1954.
157. Thoma K.H. Oral Diagnosis. W.B. Saunders, Philadelphia and London. 2nd edit. 1963. 495 pp. (p.269-284).
158. Thomas I.D. Honorary Physician, Royal North Shore Diabetic Clinic. Personal Communication. 1968.
159. Vallance-Owen J. Insulin Antagonists and Inhibitors. (p.191-205) (in Levine R. and Luft R. Ed. Advances in Metabolic Disorders Vol. 1 Academic Press, New York, 1964. 366 pp.)

160. Warfield L.H. Acute Pancreatitis followed by  
Diabetes. J. of Amer. Med. Assn. 89:9  
654:658, (Aug. 27th) 1927.
161. Warren S. The Pathology of Diabetes Mellitus.  
Bailliere Tindall & Cox 1930, 212 pp.  
(p.53).
162. White P., Joslin E.P. and Pincus G. Inheritance of  
Diabetes. J. of Amer. Med. Assn. 103:2,  
105-106 (July 14th) 1934.
163. Wilder R.H. Clinical Diabetes Mellitus and Hyper-  
insulin cited Downie E. Aetiology of  
Diabetes Mellitus Med. J. of Aust.  
1:3, 110-112, (Jan. 20th) 1951.
164. Williams R.C. and Mahan C.J. Periodontal Disease and  
Diabetes in Young Adults. J. of Amer. Med.  
Assn. 172:8, 776-778, (Feb. 20th) 1951.
165. Willis T. Clinical Diabetes Mellitus cited Downie E.  
Aetiology of Diabetes Mellitus Med. J.  
of Aust. 1:3, 110-112, (Jan 20th) 1951.
166. Woodyatt R.T. Illinois Medical Journal. cited Downie  
Aetiology of Diabetes Mellitus. Med. J.  
of Aust. 1:3, 110-112, (Jan 20th)  
1951.

167. Yellow B.S. and Benson S.A. Plasma Insulin Concentrations in Non-Diabetic and Early Diabetic Subjects. *Diabetes*, 9:4, 254-260, (July-Aug.) 1960.
168. Young F.G. Permanent Experimental Diabetes produced by Pituitary (Anterior Lobe) Injections. *The Lancet*, 2:32, 372-374, (Aug.14th) 1937.
169. Ziskin D.E., Loughlin W.C. and Siegel E.H. Diabetes in Relation to Certain Oral and Systemic Problems. Part II. A Histological Study of the Gingivae and Oral Mucous Membrane (I) in Juvenile Diabetics; (II) in Insulin-Treated and Diet Controlled Adult Diabetics; (III) in Insulin-Treated Normal Monkeys. *Am. J. Ortho. (Oral Surgery Section)* 30:3, 758-774, (Feb.)1944.
170. Ziskin, D.E., Siegel E.H. and Loughlin W.C. Diabetes in Relation to Certain Oral and Systemic Problems. Part I. Clinical Study of Dental Caries, Tooth Eruption Gingival Changes, Growth Phenomena, and Related Observation in Juveniles *J. of Dent. Res.* 23:5, 317-331, (Oct.) 1944.

## STATISTICAL REFERENCE

- S.1.. Barnard P. Preventive Department,  
Dental Faculty, Sydney University,  
Notes and personal communication.
- S.2.. Bradford Hill, Principles of Medical Statistics,  
The Lancet Ltd. London. 8th edit.  
1966, 381 pp. (p.100-151).
- S.3.. Croxton F.E. Elementary Statistics.  
Dover Inc. New York, 1953, pp. 376.
- S.4.. Diem K. Scientific Tables. Documenta Geigy,  
Geigy Australia, 6<sup>th</sup> edit. 1962.  
pp. 778.
- S.5.. Moroney M.J. Facts From Figures. Penguin, England,  
3rd edit. 1964. pp. 472.
- S.6.. Myhill J. Senior Physicist Institute of Research,  
Royal North Shore Hospital.  
Personal communications. 1968.

# Diabetic

25-29 yrs.

Age	Sex	Exam Time	Tooth brushing frequency	Smoking	Period Diabetes	Manner Diabetes	State of Diabetes	No Missing Teeth	Hypertension	Dental opacity	Scores			Period
											Diabetes	Calculus	Approx	
25	F	Am	1	Yes 20	5	Diet	F	4 <sup>++</sup>	No	No	2.33	1.33	3.66	2.72
25	F	Am	2	Yes 30	3	3/4 mixed	G	4	No	No	3.00	0.33	3.33	0.61
25	F	Am	2	Yes 16	6 1/2	3/4 mixed	G	4 <sup>++</sup>	No	No	1.83	1.33	3.66	0.86
25	F	pm	2	Yes 30	13	3/4 mixed	F	3 <sup>+</sup>	No	No	1.83	1.50	3.33	1.69
25	F	pm	1	No	16	3/4 mixed	F	16 <sup>++</sup>	No	No	1.67	1.33	3.00	1.56
26	M	Am	1	No	7	3/4 mixed	P	10 <sup>++</sup>	No	No	3.33	3.50	6.83	3.27
26	F	Am	1	Yes 10	1/2	3/4 mixed	F	12 <sup>++</sup>	No	No	4.33	4.67	9.00	3.40
26	F	pm	1	No	18	3/4 mixed	F	20 <sup>++</sup>	No	Yes	2.00	3.33	5.33	2.67
27	F	pm	1	No	15	3/4 mixed	F	7 <sup>++</sup>	No	No	2.33	2.50	4.83	1.96
27	F	pm	3	Yes 60	18	3/4 mixed	G	13 <sup>++</sup>	No	No	2.00	1.83	3.83	2.63
28	F	pm	2	No	2	3/4 mixed	F	3 <sup>+</sup>	No	No	1.33	1.17	2.50	1.34
28	F	pm	2	No	19	3/4 mixed	G	0	No	No	1.83	0.50	2.33	1.19
29	F	pm	2	Yes 40	17	3/4 mixed	F	8 <sup>++</sup>	No	No	3.33	3.00	6.33	2.83
29	F	pm	1	Yes 6	15	3/4 mixed	F	14 <sup>++</sup>	No	No	1.83	1.67	3.50	1.83
29	F	Am	2	No	22	3/4 mixed	F	6 <sup>+</sup>	No	No	4.33	2.67	7.00	2.92

↑ hyperemia  
MISSING  
FIRST  
Molar

↑ hyperemia  
M. 22 m 9  
SECOND

↑ hyperemia  
M. 12 m 9  
FIRST Bicuspid

↑ hyperemia  
3/4 mixed

↑ hyperemia  
3/4 mixed

↑ hyperemia  
over 3/4 m 5

REFERENCE TABLE II

30-39 YRS.

Diabetic

Age	Sex	Exam Time	Teeth Exam Frequency	Smoking	Period Diabetic	Major Diabetic Control	State Diabetic Control	No. of Missed Teeth	Prostheses	Per Two Pkty.	Dabire	Chickens	Hypertensi	P.R.P. in Diet
31	F	pm	2	No	13	30% insulin	G.	9 <sup>++</sup>	No	No	1.33	1.17	2.50	2.52
31	F	pm	2	Yes 40	1	30% insulin	F	19 <sup>++</sup>	No	No	2.00	2.67	4.67	2.62
31	F	pm	1	No	3	30% insulin	F	5 <sup>+</sup>	No	No	1.50	2.00	3.50	2.30
32	F	pm	2	Yes 14	1	insulin	G.	4 <sup>++</sup>	No	No	1.83	1.83	3.66	2.40
32	M	pm	1	Yes 20	14	30% insulin	F	7 <sup>++</sup>	No	No	4.17	4.00	8.17	3.20
33	M	pm	2	Yes 15	19	30% insulin	F	6 <sup>+</sup>	No	Yes	1.67	1.83	3.50	2.44
33	F	pm	2	No	6	30% insulin	G	5 <sup>+</sup>	No	No	1.50	1.33	2.83	1.59
34	F	pm	1	Yes 15	17	30% insulin	F	11 <sup>++</sup>	No	No	3.17	3.50	6.67	3.33
34	F	am	2	No	5	insulin	G	12 <sup>++</sup>	No	No	0.67	0.67	1.34	1.65
35	F	am	1	Yes 20	27	insulin	F	10 <sup>++</sup>	No	No	2.00	3.00	5.00	3.45
36	F	am	2	No	5	30% insulin	F	5 <sup>+</sup>	No	No	2.33	2.00	4.33	3.22
36	F	pm	1	No	12	30% insulin	F	9 <sup>++</sup>	No	No	2.00	1.83	3.83	2.69
36	F	pm	1	Yes 40	18	30% insulin	F	20 <sup>++</sup>	No	No	2.67	3.33	6.00	3.33
36	F	am	1	No	1	insulin	G.	13 <sup>++</sup>	No	No	1.50	1.67	3.17	2.63
37	F	am	1	No	7	Tablets	F	0	No	No	3.67	2.50	6.17	2.25

New Symbols:  
 insulin:  
 up to 30% of insulin  
 0 = lowest  
 M.S.X.P

REFERENCE TABLE II

30-39 yrs (cont'd)

Diabetic

Age	Sex	Exam Time	Tooth Exam Frequency	Smoking	Period Diabetes	Name of Diabetic Drug	Status Diabetic Control	No. of Missing Teeth	History of Seizures	Trained Family	Diets	Cholesterol	Appointments	Period in D.C.
37	M	Am	1	No	6	30/units	G	11 <sup>++</sup>	No	No	1 1/2	133	299	2-14
37	M	Am	3	No	16	30/units	F	26 <sup>+++</sup> MI	No	No	2 00	1 00	3 00	3 33
38	M	Am	1	Yes	12	30/units	G	24 <sup>+++</sup> Ego	No	No	3 00	4 00	7 00	4 50
39	F	Am	1	No	6	Tablets	F	21 <sup>++</sup>	No	No	2 00	2 00	4 00	3 82

REFERENCES TABLE III cont'd

# Diabetic

40-49 yrs

AGE	Sex	Exam Time	Insulin Frequency	Smoking	Prevalent Diabetics	Major Diabetic Control	Safe Diabetic Control	No. of Missing Tests	Asymptomatic	Retinopathy	SCORE			P.A.C. Index
											PiBAS	Calcibus	Hygiene	
41	F	am	2	No	8	Tablets	G	25 <sup>++</sup>	No	No	1.00	2.00	3.00	4.00
41	F	am	2	Yes 15	4 1/2	Insulin	F	0	No	No	0.67	0.83	1.50	1.69
41	M	pm	2	No	31	Insulin	F	20 <sup>++</sup>	No	No	2.00	2.00	4.00	3.67
42	M	pm	1	No	5	Insulin	F	8 <sup>++</sup>	No	No	4.00	5.67	9.67	6.91
42	M	am	1	Yes 20	7	DIET	F	0	No	No	3.00	4.17	7.17	4.88
42	M	pm	2	No	2	Insulin	F	8 <sup>++</sup>	No	No	1.00	2.83	3.83	4.75
43	F	am	2	Yes 3	6	Tablets	F	22 <sup>++</sup>	No	Yes	1.67	2.33	4.00	3.60
43	M	am	3	No	5	Insulin	F	11 <sup>++</sup>	No	No	1.50	1.67	3.17	3.71
44	F	pm	2	No	10	Insulin	F	15 <sup>++</sup>	No	No	2.83	3.00	5.83	3.41
44	F	pm	1	No	6	Insulin	F	6 <sup>++</sup>	No	No	1.17	1.00	2.17	0.92
44	M	pm	2	Yes 40	2	DIET	G	20 <sup>++</sup>	No	No	0.67	2.67	3.34	3.33
44	F	pm	2	No	22	Insulin	G	7 <sup>++</sup>	No	No	1.83	0.67	2.50	2.40
44	F	pm	2	No	17	Insulin	F	13 <sup>++</sup>	No	No	2.00	2.16	4.16	4.11
45	F	pm	1	Yes 20	1/2	Insulin	G	20 <sup>++</sup>	No	No	2.00	2.67	4.67	3.67
46	F	pm	2	Yes 20	1/6	Tablets	F	4	No	No	2.00	4.00	6.00	3.29

Reference Table II

# Diabetic

## 40-49 yrs (contd)

AGE	Sex	EXAM TIME	Type of Diabetes	Insulin	Period Diabetes	Max. Insulin Dose	Status Diabetic Control	No. of Missing Teeth	Amino Sclerosis	Retino Path.	SCORE			PERO INDEX
											Diabetes	Calculus	Hypertension	
46	F	am	2	YES 5	10	30/insulin	F	26 <sup>+++</sup>	No	No	2.00	4.00	6.00	3.33
46	M	am	2	YES 60	1/2	30/insulin	G.	9 <sup>+</sup>	No	No	2.00	3.17	5.17	3.91
46	M	pm	2	No	8	DIET	F	22 <sup>+++</sup>	No	No	2.00	2.67	4.67	4.00
46	M	im	1	No	1/3	insulin	F	22 <sup>+++</sup>	No	No	2.00	3.33	5.33	3.60
47	F	am	1	YES 40	22	DIET	G.	21 <sup>++</sup>	No	No	2.67	3.67	6.34	4.36
47	F	am	2	No	1/2	TABLETS	F	8 <sup>+</sup>	No	No	1.83	1.83	3.66	3.16
47	M	pm	1	No	17	TABLETS	F	20 <sup>+++</sup>	No	No	4.00	4.00	8.00	4.00
48	F	am	1	No	15	30/insulin	F	20 <sup>+++</sup>	No	No	1.67	2.67	4.34	3.38
48	M	pm	1	YES 30	4	insulin	F	14 <sup>++</sup>	No	No	2.00	1.83	3.83	3.33
48	F	am	2	No	8	insulin	F	22 <sup>+++</sup>	No	No	2.33	2.67	5.00	4.30
48	F	pm	1	YES 30	10	30/insulin	F	12 <sup>++</sup>	No	No	3.00	3.50	6.50	4.20
49	M	pm	2	YES 20	1	30/insulin	F	3	No	No	1.83	1.83	3.66	3.31
49	M	pm	1	No	1/2	30/insulin	F	9 <sup>+</sup>	No	No	2.00	3.50	5.50	4.26
49	F	pm	1	No	16	DIET	F	9 <sup>++</sup>	No	No	2.00	2.50	4.50	3.08
49	M	pm	1	YES 20	5	30/insulin	F	11	No	No	2.67	4.33	7.00	4.95

REFERENCE TABLE IV (cont'd.)

# Diabetic

40-49 yrs (cont'd)

Age	Sex	Exam Time	Tooth Brushing Frequency	Smoking	Period of Diabetes	Number of Diabetic Episodes	State of Diabetic Control	MSM History	MSM Teeth	Aggravation	Fit or Obese	Diabetes	Cholesterol	Hypertension	Fasting Index
49	F	a.m.	2	No	18	Insulin	F	12 <sup>++</sup>	No	No	No	2.00	4.00	6.00	3.80
49	F	a.m.	2	No	1	Tablets	F	8 <sup>+</sup>	No	No	No	2.50	3.50	6.00	3.67
49	F	p.m.	1	Yes	26	Insulin	F	12 <sup>+++</sup>	No	No	No	2.17	3.33	5.50	4.20

REFERENCE TABLE IV (cont'd)

Non-Diabetics.

25-29 yrs.

Age	Sex	Exam Time	Tooth brushing frequency	Smoking	No. of missing teeth	Scores				F. R. O. Index
						DEBR.S	Chalks	Hygiene	Fx	
25	F	am	2	No	4 <sup>+</sup>	2.17	0.83	3.00	0.61	
25	F	am	2	No	10 <sup>++</sup>	0.67	0.17	0.84	0.27	
25	F	pm	2	No	10 <sup>++</sup>	1.33	0.50	1.83	0.82	
25	F	am	2	Yes 10	6 <sup>+</sup>	0.33	0.00	0.33	0.34	
25	F	pm	1	No	4	2.17	1.00	3.17	1.28	
26	M	am	2	Yes 10	4	2.00	0.67	2.67	1.07	
26	F	pm	2	No	4 <sup>+</sup>	2.00	2.50	4.50	1.67	
26	F	am	2	No	4	0.83	0.17	1.00	0.53	
27	F	am	2	No	7 <sup>++</sup>	1.00	0.00	1.00	1.08	
27	F	am	2	No	5	1.67	0.50	2.17	1.04	
28	F	am	2	No	3 <sup>++</sup>	1.67	0.50	2.17	0.55	
28	F	am	2	Yes 10	2	1.67	1.00	2.67	1.20	
28	F	pm	2	No	4	0.33	0.33	0.66	1.00	
29	F	pm	3	Yes 12	4	1.17	0.50	1.67	0.86	
29	F	am	2	No	0	0.67	0.17	0.84	0.47	

Reference Table V

Non-Diabetics

30-39 yrs

Age	Sex	Exam Time	Took Breastling Frequency	Smoking	No. of Missing Teeth	Scores:			P P Index
						Debris	Calculus	Hygiene	
31	F	a.m.	2	No	5 <sup>+</sup>	2.00	1.50	3.50	1.67
31	F	a.m.	2	Yes 10	10 <sup>++</sup>	0.50	0.00	0.50	0.50
31	F	a.m.	2	No	5 <sup>+</sup>	0.83	0.50	1.33	0.81
32	F	a.m.	1	No	17 <sup>+++</sup>	1.83	1.83	3.66	2.00
32	M	p.m.	2	No	20 <sup>+++</sup>	3.33	3.67	7.00	2.67
33	M	a.m.	2	No	7 <sup>++</sup>	1.67	1.50	3.17	1.92
34	F	p.m.	2	No	4	1.13	1.00	2.13	1.07
34	F	a.m.	2	No	24 <sup>+++</sup>	2.00	0.33	2.33	0.50
35	F	a.m.	1	No	5 <sup>++</sup>	2.00	1.17	3.17	1.22
36	F	a.m.	2	No	6 <sup>++</sup>	1.67	1.00	2.67	1.61
36	F	a.m.	2	Yes 4	7 <sup>+</sup>	0.83	2.00	2.83	2.16
36	F	a.m.	2	No	4	1.00	0.17	1.17	0.96
36	F	a.m.	3	No	3	1.33	1.17	2.50	1.62
36	F	a.m.	3	No	11 <sup>++</sup>	1.33	0.67	2.00	1.64
37	F	p.m.	2	No	6 <sup>++</sup>	2.67	4.17	7.84	2.92

REFERENCE TABLE VI

Non-Diabetic

30-39 yrs. (cont'd)

Age	Sex	Exam Time	Tooth Brushing Frequency	Smoking	No. of Missing Teeth	SCORES				DPI Index
						Debris	Calculus	Hygiene		
37	M	com	1	YES 20	14 <sup>+</sup>	2.17	3.17	5.34		2.67
37	M	com	2	No	4	1.33	0.50	1.83		1.00
38	M	com	2	YES 20	13 <sup>+</sup>	1.33	1.17	2.50		1.95
39	F	com	1	No	22 <sup>+</sup>	3.00	4.00	7.00		2.80

REFERENCE TABLE VI (cont'd)

Non-Diabetics

40-49 Yes.

AGE	SEX	Exam Time	Walking Frequency	Smoking	No. of Missing Teeth	Scores			FPG INDEX
						Diabetes	Calcium	Hypertension	
41	F	pm	2	No	8 <sup>+</sup>	2.33	2.67	5.00	2.50
41	F	pm	1	No	18 <sup>++</sup>	2.80	3.40	6.20	2.85
41	M	pm	2	No	4	1.67	2.33	4.00	2.24
42	M	am	1	Yes 20	17 <sup>±</sup>	1.80	1.80	3.60	3.00
42	M	pm	1	No	4	1.33	2.33	3.66	3.56
42	M	am	2	No	7 <sup>++</sup>	0.50	0.50	1.00	0.76
43	F	pm	3	No	22 <sup>++</sup>	2.00	2.67	4.67	2.80
43	M	pm	2	Yes 30	2	1.83	2.33	4.16	2.87
44	F	am	2	Yes 20	4	2.00	3.50	5.50	2.57
44	F	am	2	No	15 <sup>±</sup>	2.00	3.00	5.00	2.94
44	M	pm	3	Yes 20	14 <sup>++</sup>	1.00	1.00	2.00	2.00
44	F	pm	1	No	21 <sup>++</sup>	2.33	2.00	4.33	3.09
44	F	am	2	No	21 <sup>++</sup>	2.00	1.00	3.00	1.64
45	F	am	2	No	5	0.67	1.17	1.84	1.36
46	F	pm	2	No	2	1.17	2.00	3.17	1.17

Reference Table VII

Non-Diabetics

40-49 yrs (cont'd)

Age	Sex	Exam Time	Tooth Brushing Frequency	Smoking	No. of Missing Teeth	SCORES				PERIODONTAL INDEX
						Debris	Calculus	Hygiene		
46	F	am	2	No	9 <sup>+++</sup>	1.87	0.87	2.74	1.78	
46	M	am	1	Yes 20	5 <sup>++</sup>	1.83	2.00	3.83	3.08	
46	M	pm	2	Yes 30	6 <sup>++</sup>	0.83	1.50	2.33	1.20	
46	M	am	2	No	7 <sup>+</sup>	1.00	1.33	2.33	1.80	
47	F	pm	2	No	22 <sup>+++</sup>	2.00	2.33	4.33	2.80	
47	F	am	1	No	21 <sup>+++</sup>	2.00	2.00	4.00	2.73	
47	M	am	2	Yes 25	21 <sup>+++</sup>	3.33	2.33	5.66	3.09	
48	F	am	2	Yes 30	23 <sup>+++</sup>	1.50	0.50	2.00	0.96	
48	M	am	2	Yes 10	11 <sup>++</sup>	2.00	2.33	4.33	2.89	
48	F	pm	1	Yes 20	21 <sup>+++</sup>	2.67	2.33	5.00	2.73	
48	F	pm	2	No	7 <sup>++</sup>	1.83	1.67	3.50	2.32	
49	M	am	1	Yes 10	4	2.50	4.00	6.50	3.22	
49	M	pm	1	No	6 <sup>+</sup>	2.33	2.17	4.50	3.00	
49	F	am	2	No	11 <sup>+++</sup>	1.50	1.00	2.50	1.90	
49	M	pm	2	No	9 <sup>++</sup>	2.17	1.67	3.84	2.24	

REFERENCE TABLE VII cont'd

40-49 Yrs (CONTD) Non-Diabetics

Age	Sex	Exam Time	Exptl Smoking Frequency	Smoking	No. of Missed Tests	Debris	Calculus	Hygiene	Pige Index
49	F	pm	2	No	19 <sup>++</sup> 	2.00	2.40	4.40	2.92
49	F	pm	1	Yes	22 <sup>++</sup> 	2.33	2.33	4.66	2.89
49	F	pm	1	No	8 <sup>+</sup> 	2.33	2.00	4.33	2.08

REFERENCE TABLE VII (cont'd)





UNIVERSITY  
OF SYDNEY  
DENTAL LIBRARY