MIXED DENTITION ANALYSIS - APPLICABILITY OF TWO NON RADIOGRAPHIC METHODS IN CHENNAI SCHOOLCHILDREN

Dissertation submitted to

THE TAMILNADU Dr. M.G.R. MEDICAL UNIVERSITY

In partial fulfillment of the degree of

MASTER OF DENTAL SURGERY

BRANCH Vlll

PEDODONTICS & PREVENTIVE DENTISTRY

MARCH 2008

Certificate

This is to certify that this dissertation entitled **"Mixed Dentition Analysis – Applicability of Two Non Radiographic Methods in Chennai School Children"** *is a bonafide record of work done by* **Dr. Naveen Kumar. K**, *Post graduate student in the Department of Pedodontics and Preventive Dentistry, Ragas Dental College and Hospital, Chennai, under my supervision and guidance during his post graduate period between 2005 – 2008.*

This dissertation is submitted to **The Tamilnadu Dr. M.G.R Medical University** *in partial fulfillment for the award of the degree of Master of Dental Surgery in Branch VIII - Pedodontics and Preventive Dentistry.*

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ACKNOWLEDGEMENT

This thesis is the result of work whereby I have been accompanied and supported by many people. It is pleasure that I have now the opportunity to express my gratitude for all of them. Though this column not sufficient to express my gratitude to, yet I humbly would like to do so.

I am deeply indebted and highly privileged to present this thesis under the able guidance of Dr. Jayanthi. M, Professor and Head, Department of Pedodontics and Preventive Dentistry, Ragas Dental College and Hospital, Chennai. I am sincerely thankful for the kind encouragement, valuable guidance and affection that I received through out my tenure as a post graduate student.

Special thanks to Dr. Ramachandran, principal, Ragas Dental College and Hospital, Chennai, for providing me with an opportunity to utilize facilities in his institution.

I express my sincere gratitude to Dr. Elizabeth, Asso. Professor, Department of Pedodontics and Preventive Dentistry, Ragas Dental College and Hospital, Chennai for the continuous support and constant encouragement during the study and my post graduate course.

I am extremely grateful to Dr. Nilaya Reddy, Senior Lecturer, Department of Pedodontics and Preventive Dentistry, Ragas Dental College and Hospital, Chennai for her constant support and valuable advice during the study and my *post graduate course. . I acknowledge the support rendered to me by Dr. Senthil, Dr.Saravanan of our department*

I express my gratitude to Mr. Ravanan, statistician for his work and valuable interpretations.

I acknowledge the help and support rendered to me by other staff members of our department.

I am extremely thankful to Dr. Daya Srinivasan, my friend and batch mate for her constant encouragement and sincere help through out my study and postgraduate course.

I express my sincere gratitude to other department postgraduates, Dr. Harsha, Dr. Madan, Dr. Ranga Reddy, and Dr. Durga Prasad who helped out in getting the sample for my thesis.

I would like to express my sincere appreciation to my fellow postgraduate colleagues, Dr. Rajasekaran, Dr. Dilna, Dr. Sankar, and Dr. Naveed for their encouragement through out my study and postgraduate course.

I will remain forever indebted to my parents and my brother, for their unwavering belief and support.

This venture would not have become a reality, had it not been for the ALMIGHTY. I thank Him for all His blessings.

Dr. NAVEEN KUMAR. K

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Introduction

Occlusion refers to the relationship between the upper and lower teeth when they are in contact; it refers to the alignment of teeth as well as the relationship of the dental arches [20].

Orthodontic patients mainly seek treatment for improvement of dental esthetics and oral health [14]. Tooth malalignment is associated with plaque accumulation, gingival inflammation, or caries only in severe cases and in patients with insufficient oral hygiene[89]. However, there might be another, indirect contribution of dental occlusion to oral health. Research on general body concept has found that individuals perceiving their dental appearance as less attractive may feel discouraged in performing health behaviors to improve or preserve their physical condition. They tend to avoid not only the presentation of their body in public but also self-confrontation with the mirror image [60]. As a consequence, such individuals tend to exercise less and show more maladaptive nutritional habits than attractive individuals do. It has been suggested that such a relationship between attractiveness and health behavior might also apply to dentistry.

The mixed dentition is a transition period of occlusion that has both primary and permanent teeth, usually lasts from six to twelve years and is associated with maximum orthodontic problems due to the inadequacy of space for erupting permanent teeth. An early assessment of available space may permit early intervention or minimize the development of malocclusion.

Mixed dentition analysis provides reliable estimation of the size of unerupted canines and premolars during the mixed dentition and provides early interruption of potential malocclusions by determining the treatment plan which will involve serial extraction, guidance of eruption, space maintenance, space regaining or just periodic observation.

The dental literature is replete with investigations focusing on the comparative accuracy, reliability, and reproducibility of various mixed dentition space analysis techniques. To date no technique has been shown to be significantly superior over others in its predictive ability. Classically mixed dentition analysis techniques rely on one of the following methods [46]:

1. The estimation of unerupted tooth size by radiographic measurement (e.g. Nance[70], 1947);
2. Predictions based on correlations between the sizes of different types of teeth within a dentition (e.g. Tanaka and Johnson[100], 1974; Moyers[67, 68], 1973 and 1988);
3. A combination of both methods (e.g. Hixon and Oldfather[40], 1958; Staley and Kerber[96], 1980).

The need of establishing a prediction method that utilizes jaw and tooth dimensions after eruption of lower incisors arises, because primary crowding is usually noticeable only after the eruption of incisors. Jaw development will rarely provide the required space to accommodate primary crowding. [105]

The most accurate predictions of the mesio-distal widths of unerupted canines and premolars can be obtained by measurements of mesio-distal widths of these teeth on radiographs combined with measurement of mesio-distal widths of the erupted mandibular permanent teeth [46, 82]. However, it requires the use of dental casts and radiographs to complete the analysis [107].

In many clinical situations quality of the available radiographic films is questionable, which requires proper training and cooperation from the child. Radiographic image enlargement is systematic and fairly constant, but when proper technique not followed the values obtained will be higher and inaccurate than the values obtained by non radiographic methods Due to these practical limitations the radiographic based prediction methods would not offer enough solutions to the general management of these patients, which has made the non radiographic methods [67, 68,100] more reliable.

Moyer recorded that there is a correlation between the combined mesiodistal width of the mandibular incisors and the combined mesiodistal widths of cuspids and premolars in each arch. It is also noteworthy that Moyer has provided two sets of tables for mixed dentition space analysis, one for both the sexes combined (1973), which does not correlate with his table that contains for sexes separately (1988). Tanaka and Johnston (1974) developed tables comparable with Moyer's, but realized that simplifying mixed dentition space analysis would widen its clinical application. They introduces simple, easily remembered and applied regression equations for estimating summed dimensions of the maxillary and mandibular canine and premolar segments. The most widely employed methods of mixed dentition space analysis have been developed for North American Caucasian children and it is reasonable to question their use in other populations, because of the variation in tooth size. [63, 32,81,10,107,55]

There have been several studies about the applicability of two non-radiographic methods i.e. Moyer's, (1973, 1988) and Tanaka and Johnston, (1974) in other population groups, which concluded that both methods underestimated the tooth dimensions in the non-Caucasian samples [87, 47, 24]. Both Tanaka and Johnston (1974) and Moyer's (1988) at 75% have been found to overestimate the tooth size in Caucasian samples [10,107,55].But Tanaka and Johnston (1974) and Moyer's (1988) had shown a positive correlation though at different probability [81] for the South Indian population sample. Since the Chennai population is lacking the formulation of such predication tables for its own populations, keeping in view of the racial, geographical differences, this study was designed to evaluate the applicability of Tanaka and Johnston (1974) and Moyer's (1988) methods in assessing the size of permanent canines and premolars in Chennai children.

Aims & Objectives

The aim of this study was to evaluate the applicability of the Tanaka and Johnston (1974) and the Moyer's (1988) methods of predicting the size of permanent canines and premolars in Chennai school children.

OBJECTIVES

1. To compare the predicted values of m-d widths of permanent canines and premolars from Tanaka and Johnston (1974) Moyer's method (1988) with the measured values.

2. To provide the base line data with the measured mesio distal diameter of all permanent teeth till first permanent molar for the Chennai children.

Review of Literature

Black (1897) [13] determined the average mesio-distal crown widths of all primary and permanent teeth, though he did not indicate the population from which the data were derived. Therefore, the use of these average mesio-distal tooth sizes could not be justified with the evidence of tooth size variations within individuals and population groups.

The widely used methods to predict the sum of the unerupted permanent canines and premolars depend upon the statistical correlation of the sum of four permanent mandibular incisors and the sum of the canines and premolars (Ballard and Wylie, 1947; Carey, 1949; Tanaka and Johnston, 1974; Moyer's, 1958, 1973, 1988).

Ballard and Wylie (1947) [7] examined 441 individuals, and developed a prediction equation (X=9.41 +0.52Y) based on a correlation relationship between the sum of the mesiodistal widths of the mandibular incisors and the sum of the mesiodistal widths of the permanent canine and premolars. Specifics as to gender, age, and ethnicity were not stated, in the equation, X is equal to the sum of the mesiodistal widths of the permanent canine and premolars, while Y is equal to the sum of the mesiodistal widths of the mandibular four incisors. Finally, they came to the conclusion that their method had only 2.6 per cent error (0.6 mm) as compared to a 10.5 per cent error (2.2 mm) when using radiographs only. Therefore, they suggested the use of their method as an adjunct to Nance (1947) method.

Nance (1947) [70] proposed the measurement of the mesio-distal widths of unerupted tooth from an individual radiographs, during which the clinicians probably relied mainly on the averages of mesio-distal tooth widths published by Dr. G.V. Black (Black, 1902). He claimed that this assessment was accurate in most cases. He also measured total arch length (from the mesial surface of one permanent first molar to the other) and showed that, in the transition from the mixed to permanent dentition, molars move mesially by, on average, 1.7mm in lower arch and 0.9mm in the upper arch, thus accounting for the alteration that occurs in the relationship of permanent first molars.

Carey (1949) [19]also published a method of analysis for the estimation of the sizes of lower cuspids and bicuspids by measuring the mesiodistal diameter of the four lower incisors. He used the formula: $LA + 2X + 3.4 = LD$; where, LA = sum of the width of lower anterior teeth, X = estimated size of the two premolars and cuspids, LD = linear dimension and 3.4 represents the mesial drift (1.7) of the permanent molars.

Moorrees (1957) [64] measured the dentition of Alaskan Aleuts and compared them to North American Caucasians. He found that the teeth from first molar on one side to first molar on the opposite side were slightly larger in the Aleuts, with relatively smaller differences in the size of the central and lateral incisors. Male Aleuts have larger teeth than females, with the difference most pronounced in the mandibular cuspids.

Foster and Wylie (1958) [28] suggested that it is more reliable to use the direct measurements of the erupted teeth than rely upon measurements made from intraoral radiographs of dubious quality. He examined 72 children at 18 month intervals over a period of 10 years, 14 children being available at the end of the study. They found that the reduction in arch length was variable, but less than that reported by Nance. They also estimated the mesio-distal widths of unerupted teeth by two methods: the Ballard and Wylie method, and by measuring teeth on radiographs taken by long cone technique. They compared these estimates with the actual sizes of the teeth after they had erupted. Both methods showed inaccuracies, ranging from over-estimates of 3.9 and 4.0mm and underestimates of 5.7 and 1.6mm by the Ballard and Wylie and radiographic methods, respectively.

Hixon and Oldfather (1958) [40] Using a sample of 41 American born children of northwestern European descent, predicted the widths of unerupted mandibular canines and premolars from the sum of the mesiodistal dimensions of the central and lateral incisors and the images of the first and second premolar from long cone radiographs. The study concluded that the index of forecasting efficiency for this technique shows a 25% improvement over previously suggested methods.

The variability found between the combined widths of the deciduous molars and cuspids and their permanent successor ranged from 0.1 mm to 4.4mm.The standard deviation of this difference in size between the two groups of teeth is decidedly greater than the standard error of estimate of the technique proposed for estimating the size of the unerupted cuspids and bicuspid.

Moyer's (1958) [66] developed a probability chart by Utilizing direct dental cast measurements from department of orthodontics, University of Michigan school of dentistry The Moyer's analysis used the sum of the widths of the mandibular incisors to predict the sum of both mandibular and maxillary canines and premolars at various probability levels (5% to 95%), initially as combined tables for both sexes (Moyer's, 1973), and later as separate tables for either sex (Moyer's, 1988). Neither the sample nor the regression equations upon which Moyer's (1958, 1973, 1988) tables are based have been described in the literature. However, he recommended its use at 75% probability level, which clinically, is thought to give protection on the crowded side. Although of questionable reliability, Moyer's (1988) and Tanaka and Johnston (1974) are still widely accepted because they do not require radiographs and are simple and quick to perform.

Despite of these low to moderate correlations some advantages exist in their clinical use. The location of the four permanent mandibular incisors in the midst of the space management problems not only offers one of the advantages in their use in predicting the unerupted tooth sizes of the canines and premolars but also easy accessibility for accurate measurement both in the mouth and on the dental casts (Moyer's, 1988). Furthermore, the mandibular incisors erupt early in the mixed dentition and have very low variability in shape and size (Moyer's, 1988). It is also claimed that with the eruption of the first permanent molars and mandibular incisors, most of the expected growth in the mandibular arch has been accomplished (Sillman, 1964).

Bull (1959) [15] measured the mesiodistal width of erupted permanent first molars on the periapical radiographs and compared them with the measurements of same teeth on dental casts. With the target–film distance set as 8 inches, radiographic measurement was 3.3% grater than the direct measurement; with a target–film distance of 16 inches it was 2.3% grater. From this he produced a mathematical formula $Y = d \times c / [2d - c]$, in which Y = estimated mesiodistal width of the tooth, d = mesio-distal width of the tooth on the radiograph target – film distance set as 8 inches, and c = mesio-distal width of the tooth on the radiograph target – film distance set as 16 inches.

Ono (1960) [73] working in Japan developed a regression equation to predict the mesiodistal width of unerupted permanent canine and premolars in the Japanese population. He was the first researcher to present a tooth size prediction analysis based on a population other than Caucasian children. Similar correlation coefficient values, r= 0.57 were determined for Japanese permanent incisors and permanent canine and premolars in both arches as well as the mandibular permanent incisors and maxillary permanent canine and premolar

Dahlbert (1951, 1963) [22] described the dentition of people of Mongoloid stock as having shovel-shaped incisors with prominent marginal ridges and cingulum, with their mesiodistal diameter close to that of American Caucasians. He found the size of the bicuspids to be relatively smaller in the North American Indians.

Huckaba (1964) [43] recognized the need to compensate for radiographic distortion which occurred due to elongation or shortening. He developed the procedure on the basis that the degree of magnification on a given film is approximately the same for a primary tooth as for its underlying permanent successor.

Lundstrom (1964) [57] compared 97 pairs of like-sex monozygotic and dizygotic twins and found a stronger correlation in mesiodistal tooth size between monozygotic twins. He concluded that tooth size within a given population is determined to a large extent by genetic factors.

Moorrees and Reed (1964) [63] found relatively low correlations between the size of the deciduous and the permanent teeth, indicating that great variation exists between the sizes of the permanent teeth compared with their deciduous predecessors.

Lavelle (1972) [53] stated that average mesiodistal crown diameter has been shown to be greater in black people than among whites Tanaka and Johnston (1974) conducted a study that would repeat Moyer's observations on a new, larger sample that was drawn from a contemporary orthodontic population. Dental casts for 506 patients in the Cleveland area of probable European descent less than 20 years old were studied. They utilized a simple linear regression equation to establish prediction tables. The prediction tables constructed by Tanaka and Johnston were practically identical to those published by Moyer's. The mandibular incisors showed a correlation of r=0.625 for the maxillary canine premolar region and r=0.648 for the mandibular canine premolar region .Tanaka and Johnston concluded that the size in millimeters of unerupted canines and premolars at the 75thpercentile be predicted by taking half the sum of the width of the mandibular incisors and adding 11 .0 for the maxillary teeth and 10.5 for the mandibular teeth.

Tanaka and Johnston (1974) [100] also used the sum of the mesio-distal widths of the mandibular central and lateral incisors to develop regression equations in predicting the sizes of the unerupted canines and premolars. They measured teeth on 506 casts of patients of probable European ancestry. The correlation coefficient between the sum of mesiodistal width of mandibular permanent canines and premolar teeth was similar to that of Ballard and Wylie and Hixon and Oldfather. In few of the subjects was the sum of width of mandibular incisors outside the range 20.5-27.0mm, and they developed an equation similar that found of Ballard and Wylie: Y = A + B(X), in which Y = predicted sum of widths of the four mandibular incisors, and A and B = constants for each arch being 0.41 and 0.51, respectively, for the maxilla and 9.18 and 0.54 for the mandible. From this Tanaka and Johnston produced simplified equation for each segment : (i) sum of the widths of maxillary canine and premolar teeth = half the widths of the mandibular incisors + 11.0 mm and (ii) sum of the widths of mandibular canine and premolar teeth = half the widths of the mandibular incisors + 10.5 mm. However, the standard errors of estimates for the correlations were rather high (0.86 mm for the maxillary and 0.85 mm for the mandibular teeth) (Irwin et al., 1995). More recently Nourallah et al. (2002) found higher correlation of the two permanent mandibular incisors and two permanent maxillary first molars and suggested their use in the new prediction tables and regression equations for a Syrian population.

Kaplan et al. (1977) [49] compared the accuracy of the Hixon and Oldfather (1958), Moyer's (1973), and Tanaka and Johnston (1974) mixed dentition analyses. They proposed a modification of the Hixon-Oldfather (1958) equation wherein the width of the mandibular lateral incisor was not used. The other three values were added to yield a value in close approximation to the combined widths of the canine and premolars. Computed values are then added to the predicted values to improve the accuracy. It should be noted that their equation was based on the use of a 19-inch target-skin distance, rather than the standard 16-inch long-cone distance. They concluded that the Hixon and Oldfather analysis was the most accurate of the three methods for predicting the size of the unerupted permanent canines and premolars. Zilberman et al. (1977) checked the accuracy of the Moyer's (1973) and Hixon-Oldfather (1958) estimations in a group of forty-six Israeli children. They found a stronger correlation in both arches between observed sizes and measurements from the radiographs than from the Moyer's' tables (Moyer's, 1973). The scatter around the regression line based on, Moyer's (1973) estimate was larger than that around the regression line based on radiographic findings. Their study also indicated that the combination method developed by Hixon and Oldfather (1958) was comparable in accuracy to the strictly radiograph measurement technique.

Sim Joseph. M. (1977) [91] proposed the 21-23 rule, allows an instant evaluation of whether there is enough space in each quadrant to allow eruption in an uncrowded fashion of the critical permanent teeth located between the lateral incisors and the first permanent molars. The key to this method is the probability (at 80% level of confidence) that the space needed in a lower quadrant for the eruption of 3 4 5 will not exceed 21 mm, and that the space needed in an upper quadrant for the eruption of 3 4 5 will not exceed 23 mm. This method will provide the quick estimation of space needed during the orthodontic examination of the child with an accuracy of above 80%. However these measurements must be confirmed later by a more complete evaluation

Zilberman Yerucham, Edith Koyoumdjisky-Kaye, and Alexander Ardimon (1977) [111] made a study to check the accuracy of Moyer's and Hixon and Oldfather estimations applied in a group of Israeli children, and compare the resulting estimations to the size of these teeth following their eruption. Forty-six Jewish children of both sexes, who had received treatment in the Orthodontic Department of the Dental School in Jerusalem, were randomly selected from the Department files, The inspection of each of the forty six measurements of the present study gave the impression that the estimation of tooth size according to Moyer's method is closer to the observed size than it is according to the intra oral x-ray image

Igervall B, Lennartsson B. (1978) [45] used multiple stepwise regressions in the selection of mixed dentition variables capable of predicting the total breadth of the unerupted permanent canine and premolars. The material consisted of 77 children. Stone casts were made before and after eruption of the canine and premolars. At the first examination when the children were, on the average, 10 years old, intra oral roentgenograms were obtained of the canine and the premolars. To predict the total breadth of the upper canine and premolars the buccolingual breadth of the upper first permanent molar and measurements on roentgenograms of the breadths of the upper canine and premolars proved most useful. In the prediction of the total breadth of the lower canine and premolars the best results were obtained with measurement of the breadths of the teeth in the roentgenograms. The breadth of the incisors proved less useful as a predictor of the breadths of unerupted canines and premolars.

Gardner RB. (1979) [30] made a comparison of four methods of predicting arch length Nance, Johnston-Tanaka, Moyer's, and Hixon Oldfather. Four arch length prediction equations {Nance, Johnston Tanaka, Moyer's and Hixon-Oldfather) were compared by examining pretreatment casts, pretreatment intra oral radiographs and post treatment casts of forty-one patients of mixed-dentition age. A comparison of correlation coefficients and slopes of the predicted arch length versus the actual arch lengths revealed that the Hixon-Oldfather method conformed closest to the ideal. No combination of the four methods produced a more accurate equation than the single most accurate method. Neither the sex of the patient nor the type of occlusion affected the prediction accuracy of any of the four equations. All methods tend to over predict the arch length size by 1 to 3 mm, with the exception of the Hixon-Oldfather equation, which under predicted by approximately 0.5 mm. An analysis of the intra investigator error showed a very low standard error of estimate for individual tooth measurements and for the prediction values. A variance analysis showed that most of the variation was due to arch length (85%). A slight amount was due to the prediction method (8%), and 6% of the variation was due to the rater. A low correlation was found between space available versus actual discrepancy and space available versus actual arch length. High correlation coefficients were found for the predicted arch lengths when compared with the actual arch lengths. As expected the correlation coefficients for the predicted widths of only the canines and premolars compared with the actual widths were not quite as high.

Staley RN, Shelly TH, Martin JF (1978) [94] the purpose of their investigation was to determine whether, with multiple regression analysis. A more accurate method than is now available for predicting the widths of unerupted mandibular canines and premolars of mixed-dentition patients could be developed. Regression analyses were performed on data derived from 83 Caucasian subjects (42 males and 41 females) who participated in the Iowa Growth Study. Measurements were taken on plaster casts of the mandibular incisors, canines, premolars, and first molars. Measurements of the mandibular canines, premolars, and first molars were obtained from periapical radiographs taken with a long-cone technique. Newly developed regression equations for each sex had the highest correlation coefficients and smallest absolute errors of estimate when compared to previously published methods. The new equations and previous prediction methods were tested on a sample of 55 orthodontic patients (23 males and 32 females). The newly developed equations were also the most accurate method of prediction in the orthodontic patient sample.

Smith (1979) [92] checked the accuracy of the analysis based on Moyer's (1973) tables, Hixon and Oldfather.s (1958) combination procedure, and their Tri-4 analysis. They concluded that the Tri-4 analysis appeared to be simpler and a more accurate method for mixed dentition analysis than those in common use at that time. However, Gardner (1979) found that Nance (1947), Moyer's (1973) and Tanaka and Johnston (1974) tended to over predict by 1 to 3 mm, while the Hixon and Oldfather (1958) was more likely to under predict by about 0.5 mm.

Robert N. Staley, and Paul E. Kerber (1980) [96] undertaken revision of the Hixon and Oldfather prediction method with measurements obtained from persons who participated in the Iowa Facial Growth Study, the same group of subjects used originally by Hixon and Oldfather to develop their prediction equation. A significantly improved prediction equation was developed. A graph was made for clinical use in the prediction of mandibular canine and premolar widths in mixed-dentition patients. A sample of normal persons was selected from the longitudinal records of the Iowa Facial Growth Study conducted between 1946 and 1960. This sample consisted of fifty seven subjects (twenty-seven males and thirty females) of Northwest European ancestry who lived in the vicinity of Iowa City, Iowa. The cross validation sample consisted of longitudinal data taken from the records of fifty three Caucasian subjects (twenty-three males and thirty females) who were patients in the Department of Orthodontics at the University of Iowa between 1961 and 1972. The findings indicate that the newly developed equations represent a significant improvement over the original Hixon and Oldfather equation. The simple computations and the convenient graph make this accurate prediction method very suitable for clinical use Kellam (1982) compared tooth measurements of 40 Navajo Indians from Shiprock, New Mexico to those of 40 Caucasian patients from the Orthodontic department at the University of Iowa.

He found the sum as well as the individual tooth diameters to be greater in Navajos than in Caucasians Staley RN, O'Gorman TW, Hoag JF, Shelly TH. (1984). The purpose of their study was to develop, with simple linear regression analysis, equations that could accurately predict the mesiodistal widths of unerupted canines and premolars in both arches of the mixed dentition patient. Clinically useful prediction equations were developed and tested on a sample of orthodontic patients. Performance of the equations in patients was satisfactory.

Motokawa W, Ozaki M, Soejima Y, Yoshida y. (1987) [65] They developed a method of space analysis based on the fact that the measurement between the distal surfaces of the mandibular permanent lateral incisors was approximately equal to that of the combined widths of the mandibular permanent canine and premolars. This method is referred to as Inter lateral Incisor Width (I.L.I.W.) Analysis. One hundred and nineteen Japanese children, without malocclusion, were selected for the study. Various measurements of teeth were taken in their mouths with a modified, fine tipped, electrical, digital caliper and recorded in a Handheld Computer by connecting it to the caliper. Statistical analyses were conducted to compare the accuracy of the I.L.I.W., Ono, Moyer’s, and Ballard and Wylie analyses in the mandibular arch. The summary of the results were: Correlation coefficients for the sum of the actual mesiodistal dimensions of the canine and premolars with their predicted values obtained by each of the four analyses revealed $r = 0.63$ for I.L.I.W., $r = 0.55$ for Ono, $r = 0.57$ for Moyer’s, and r 0.55 for Ballard and Wylie. Ono, I.L.I.W. method presented the best correlation of the four analyses, although each indicated a relatively low correlation. This method does appear to be clinically valid, since it is simple enough to enable the practitioner to estimate the combined dimension of the unerupted canine and premolars by measurement, in the mouth, of the distance between the distal surfaces of both mandibular permanent lateral incisors, instead of on study casts. It is recommended that a radiographic method be used in conjunction with their method to obtain a more accurate estimate.

Bishara Samir E., Jane R. Jakobsen, Essam M. Abdallah, and Arturo fernandez Garcia, (1989) [11] compare the mesiodistal and buccolingual crown dimensions of the permanent teeth in three populations from Egypt, Mexico, and the United States. The purpose of this study is to examine the mesiodistal and buccolingual crown dimensions in three populations- 57 subjects (35 boys and 22 girls) from Iowa city, Iowa; 54 subjects (30 boys and 24 girls) from Alexandria, Egypt; and 60 subjects (26 boys and 34 girls) from Chihuahua, Mexico. The study concluded that Comparisons between the mesiodistal diameters of the Iowa, Egyptian, and Mexican boys and girls indicated the presence of statistically significant differences. There were fewer differences in either the individual or the sum of tooth diameters between the boys than between the girls.

Van Der Merwe Sw, Rossouw P, Van Wyk Kotze Tj, Trutero H.(1991) [104] made an adaptation of the Moyer's mixed dentition space analysis for a Western Cape Caucasian population.200 dental plaster casts of Western Cape Caucasoid subjects, all of whom were under the age of 21 years, were used in this study. Mesio-distal measurements (MD lengths) were obtained of all the teeth, disregarding the third molars. This data was used to develop regression equations, for maxillary and for mandibular arches, to enable the prediction of the mesio-distal lengths of the canine and two premolars. The study identified the sum of the Mesio-distal lengths of the permanent lower incisors as the best predictor. It appears that separate predictions for male and female are not warranted. The equations and the predicted values were school children of northern European descent. If the patient fits this population group, the Staley-Kerber method will give the best prediction, followed by the Tanaka-Johnston and Moyer's approaches. These methods were superior to measurement from radiographs. On balance, the Tanaka Johnston method probably was most practical because no radiographs are required and the simple calculation can be printed right on the space analysis form, so that no reference tables must be consulted. On the other hand, if the patient does not fit the population group, as a black or oriental would not; direct measurement from the radiographs is the best approach. In addition, if obvious anomalies in tooth size or form are seen in the radiographs, the correlation methods (which assume tooth size relationships) should not be used for any patient.

AI-Khadra BH. (1993) [2] made a Prediction of the size of unerupted canines and premolars in a Saudi Arab population. When he applied the Moyer's probability tables to a limited sample of a Saudi Arab population, he found that the 35% level was a more accurate determinant than the commonly used 75% confidence level. Likewise, the prediction equations of Tanaka and Johnston overestimated the size of buccal segments in this population. The data illustrate the limitations of these methods when applied to a sample population of other than European descent. From this data, two linear regression equations were developed for tooth size prediction in Saudi Arab children.

Lima and Monnerae (1993) [56] proposed the use of oblique teleradiographs for determining the sizes of unerupted lower permanent canines and premolars. They proposed that measurements of the teeth on the radiograph should be multiplied by 0.928 for correction of magnification. This method produced a high determining coefficient and low standard error (.41mm for each hemi arch) for white Brazilian individual Irwin RD Herold JS, Richardson A (1995) reviewed methods that have been proposed for mixed dentition analysis. Prediction of the space required in the dental arch for unerupted permanent canines and premolars has been based either on the correlation between the mesio-distal widths of these teeth and of erupted mandibular incisors, or on measurements of the unerupted teeth on radiographs. Studies comparing the different methods have shown that the method of Hixon & Oldfather (1958), as refined by Staley & Kerber (1980), was the most accurate.

De Paula (1995) [23] investigated the accuracy of the use of measurement of the mandibular canines and premolars directly on the 45° Cephalometric radiographs on forty Brazilian children. They found that there were significant differences between the actual values of mandibular canines and premolars at one percent level in both boys and girls probably due to magnification factor inherent to their radiographic technique (7.3 % for boys and 8.5 % for girls). However, when compared with Moyer's (1988) at 75 %, Tanaka and Johnston (1974), Carey (1949), and Ballard and Wylie (1947), their prediction method still produced better correlations with the actual values of canines and premolars (r= 0.821 for boys and r= 0.73 for girls).

Schirmer UR, Wiltshire WA. (1997) [87] made an orthodontic probability tables for black patients of African descent. Data were collected from a series of 100 randomly selected study models of black patients. The sample was equally subdivided by gender and all subjects had Angle Class I molar relationship with only minor malocclusions such as minor crowding, rotations, or diastemas. Two investigators independently measured the teeth on the study casts with a Vernier gauge that had sharpened caliper tips. Intra examiner and inter examiner reliability was determined at 0.2 mm. All teeth including the first molars were measured. These data were then utilized to create regression equations for both maxillary and mandibular arches and to enable the prediction of the mesiodistal widths of the canines and two premolars. The equations and predicted values were compared with those of the Moyer's probability tables, and significant differences ($p < 0.05$) were found (except for the prediction of maxillary canines and premolars in females at the 85 and 95 percentile probability level). New probability tables for black subjects were formulated. It was envisaged that the proposed probability tables would be more accurate for black patients of African ancestry.

Keith Kwok-wah Yuen, Endarra Lai-king Tanglisa Lai-ying (1997) [52] Using simple linear regression analyses, prediction equations for the combined mesiodistal crown diameters of canines and premolars based on lower incisor size were generated from 97 Hong Kong Chinese (51 males and 46 females, average age 12.31 years) out of a sample of 112. The mesiodistal crown diameters of the permanent teeth were measured using calipers and recorded to the nearest 0.01 mm. Significant sex differences were found for the combined diameters of the canine-premolar segments. The coefficients of correlation between combined diameters of canines and premolars and lower incisors ranged from 0.65 to 0.79. Significant sex differences of the regression equations were found and thus four simple linear regression equations were generated. Coefficients for the slope ranged from 0.58 to 0.66, and coefficients for the intercept ranged from 6.66 to 8.82. The R2 values, standard errors of estimate, and absolute mean errors revealed that prediction models for females were less precise than those for males. Probability tables were constructed from the results of the present study. the prediction equations were found to differ from those of Tanaka and Johnston. Accuracy in the mixed dentition analysis for southern Chinese would be improved by applying the predicting equations or probability tables generated from the present study.

Jaroontham J, Godfrey K. (2000) [47] produced simple linear regression equations to be used for mixed dentition space analysis for males and females, and sexes pooled in a population living in northeastern Thailand. Measurements of teeth were made to within 0.01 mm on the dental casts of 215 boys and 215 girls (mean age 15.7 years). All dentitions were required to be free of any signs of dental pathology or anomalies. It was found that males had significantly larger teeth than females as represented by summations of mandibular incisor, canine, and premolar widths. ANOVA of regression indicated a close relationship between mandibular incisor summation and corresponding summations of canine and premolars. The low coefficients of determination (r2) of the regressions ranged between 0.29 and 0.42, and were higher for females than males, which might be attributable to the ethnic diversity of the sampled population. The regression equations produced predictions of mesio-distal width summations for maxillary and mandibular canine and premolar arch segments that were slightly different from other reported Asian studies. Moyer's prediction tables at the 50th percentile were found to under-estimate tooth size summation compared with the present investigation. The predictions from simplified regression equations matched well with those of this study for sexes pooled, and for males and females separately.

Nourallah Abdul Wahab, Dietmar Gesch, Mohammad Nabieh Khordaji, Christian Splieth, (2002) [71] performed a study to validate Tanaka and Johnston's analysis on 600 Syrian patients aged 14-22 years were selected from the records of the Orthodontic Department at Damascus University. Tanaka and Johnston's tables, equations, and approximations were modified in order to improve the accuracy of the prediction. The correlation coefficients' found between the size of the permanent mandibular central incisors and maxillary first molars (31, 41, 16, and 26) and the maxillary and mandibular canines and premolars were high (r = .72 and .74, respectively). New, more accurate prediction tables applicable at earlier ages, and new regression equations were constructed. In addition, new easier approximations were developed to allow the prediction of the size of the unerupted maxillary canines and premolars by adding 6 mm to the half-widths of teeth 31, 41, 16, and 26. The analogous prediction of the size of the unerupted mandibular canines and premolars were obtained by adding 5.5 mm to the half-widths of same teeth, 31, 41, 16, and 26. Modifications made on both the prediction tables and the regression equations of Tanaka and Johnston's analysis allowed a simplified approximation of the sizes of the mandibular permanent canines and premolars to be predicted with higher accuracy in a Syrian population. The new analysis prediction tables and new regression equations based on teeth 31, 41, 16, and 26, which erupted earlier than the teeth used by Tanaka and Johnston proved even more accurate than both previous equations.

Verzi P, Leonardi M, Palermo F. (2002) [57] carried out mixed dentition space analysis in a Thai population. The purposes of this study were: 1) predicting the sum of Mesio-distal crown diameters of unerupted canines, first and second premolars, using the sum of mesio-distal diameters of lower permanent incisors, in a sample of Eastern Sicily population; 2) estimating the differences between our predictions and the one developed by Tanaka & Johnston, by Moyer's and by Ballard & Wylie. They selected 150 plaster casts of permanent dentition of patients - 82 females and 68 males - examined at the School of Orthodontics of the University of Catania. The width of canines, first and second premolars and lower incisors were taken by means of a bow compass and a sliding digital caliper on the selected plaster casts. They calculated the following linear regression equations, with statistical method, to predict the sum of mesio-distal dimensions of canines, first and second premolars (Y) using the width of the lower incisors (X): $Y_{fs} = 11.40 + 0.42X$ for females in the upper arch; $Y_{fi} = 11.34 + 0.41X$ for females in the lower arch; $Y_{ms} = 12.84 + 0.39X$ for males in the upper arch and $Y_{mi} = 11.38 + 0.44X$ for males in the lower arch. The results indicate that the sum of mesio-distal crown diameters of canines, first and second premolars was smaller in females than in males; besides those results suggest that the North-American authors' predictions overestimate the mesio-distal dimension of canines, first and second premolars in both sexes.

Tootla R, Fayle SA.44 (2003) [101] performed a study to compare the accuracy of space prediction for the unerupted permanent canines and premolars by a recognized method of mixed dentition space analysis (Moyer's technique) vs. estimation by simple visual observation (SVO). Twenty clinicians with varying levels of dental experience and training blindly assessed study models of 4 intact arches (2 maxillary and 2 mandibular) from 3 patients in the mixed dentition using both Moyer's and SVO space prediction methods. Corresponding full-mouth panoramic radiographs were available for each case. Follow-up records of the eventual outcome in the permanent dentition for each case available (i.e., study models prior to any form of orthodontic intervention) served as the standard for further comparison of the space predictions made. Predictions by both methods were compared with each other as well as with the eventual space situation in the permanent dentition. The differences in overall mean space prediction between the Moyer's technique (excluding molar shift) and SVO ranged between 3.67 mm to 6.9 mm (lower arches) and 4.3 mm to 4.8 mm (upper arches). Diagnostic consistency between both methods' predictions was highly variable, with correlation ranging from moderate ($r = 0.53$, $P = .01$) to very weak ($r = -0.1$). Generally, more crowding was estimated with the SVO method's predictions. However, the inclusion of molar shift in the Moyer's analysis resulted in the prediction of more crowding in the mandible compared to SVO and eventual outcome in the permanent dentition. The range and. variability in predictions was always smaller with the Moyer's technique compared to SVO. Neither technique's mean space prediction more closely resembled the eventual space situation in the permanent dentition. This study demonstrated that although the Moyer's technique demonstrated less variation and more reproducibility than SVO in its space predictions, neither of the techniques was any more accurate in predicting the final space outcome in the permanent dentition.

Diagne F, Diop-Sa K, Ngom PI, Mbow K. (2003) [24] carried out mixed dentition analysis in a Senegalese Population the objectives of this study were the following: (1) to produce odontometric data for a Senegalese population sample, (2) to derive coefficients of correlation between the combined mesiodistal widths of the permanent mandibular incisors and the canine and first and second premolars of a maxillary or mandibular quadrant, (3) to test the reliability of both the Moyer's and the Tanaka and Johnston methods in a Senegalese group, and (4) to construct probability tables for Senegalese children. Fifty black Senegalese students (25 women, 25 men, mean age 23.50 years) were selected from the University Cheikh Anta Diop in Dakar, Senegal. The mesiodistal crown diameters of the permanent teeth were measured with calipers. Significant sexual dimorphism was found in tooth sizes. The correlation coefficients between the total mesiodistal width of the mandibular permanent incisors and that of the maxillary and mandibular canines and premolars were found to be 0.53 and 0.70, respectively. The standard error of the estimate was better (0.66) for women in the maxilla, and the r 2 values ranged from 0.46 to 0.57 for both sexes. Prediction tables were prepared. The study concluded that 1. Statistically significant sexual dimorphism in tooth sizes exists in Senegalese children.2. The Tanaka and Johnston prediction equations and the Moyer's charts (50%) do not accurately predict the mesiodistal diameters of unerupted canines and premolars in Senegalese children. 3. The discrepancies observed could be the result of racial diversity in the Senegalese group. 4. The specific probability tables proposed here for Senegalese children should be accurate when applied to local children, despite the ethnic diversity of Senegal. 5. The accuracy of the proposed prediction tables should be tested in various ethnic groups in Senegal.

Buwembo W, Luboga (2004) [17] conducted a study to assess the applicability of Moyer's method in different ethnic groups. Moyer's method which is commonly used for this analysis was based on data derived from a Caucasian population. The applicability of tables derived from the Moyer’s data to other ethnic groups has been doubted. However no meta-analyses have been done to statistically prove this. The seven articles included in this study were identified by a literature search of Medline (1966-June 2003) using predetermined key words, inclusion and exclusion criteria. 195 articles were reviewed and meta-analyzed. Overall the correlation coefficients were found to be border line in variation with a p-value of 0.05. Separation of the articles into Caucasian and Asian groups also gave borderline p-values of 0.05. The study concluded that Variation in the correlation coefficients of different populations using Moyer’s method may fall either side. This implies that Moyer’s method of prediction may have population variations. For one to be sure of the accuracy while using Moyer’s method it may be safer to develop prediction tables for specific populations. Thus Moyer’s method cannot universally be applied without question.

Vanessa Paredes; Jose Luis Gandia; Rosa Cibrian (2005) [106] developed a new, fast, and accurate computerized method to predict unerupted mesiodistal tooth sizes and to determine which reference tooth or combination of reference teeth was the best predictor for canines and premolars in a Spanish sample. The dental casts of 100 Spanish adolescents with permanent dentition were measured to the nearest 0.05 mm with a two dimensional computerized system. The goal was to predict unerupted canine and premolar mesiodistal tooth sizes using the sizes of the upper central incisor, upper and lower first molar, or a combination of these as a reference and using a specific mesiodistal tooth-size table. The results showed that the Digital Method proposed was very accurate in predicting unerupted canine and premolar tooth size. The combination of the sums of the permanent upper central incisor and the lower first molar was the best predictor for canines and premolars in this sample. Upper arch teeth were better predicted than lower arch teeth. The upper lateral incisor provided the worst predictions.

Fernando Lima Martinelli; Eduardo Martinelli de Lima; Roberto Rocha; Monica Souza Tirre-Araujo (2005) [27] gave a Prediction of Lower Permanent Canine and Premolars Width by Correlation Methods. The aim of this study was to determine linear regression equations to estimate the widths of unerupted lower permanent canines and premolars using measurements obtained from 458 oblique tele radiographs. The sample consisted of 30 white Caucasian patients orthodontically treated at the Faculty of Dentistry, Universidade Federal do Rio de Janeiro. The records for each patient included a 458 oblique teleradiographs (left side) in the mixed dentition period and a dental cast of the permanent dentition. Pearson's test was applied between each lower canine, first and second premolars measured on the radiograph, and the sum of their actual widths measured on the dental cast. The strongest correlation occurred for the first premolars for one side (0.82) with permanent dentition were measured to the nearest 0.05 mm with a two dimensional computerized system. The goal was to predict unerupted canine and premolar mesiodistal tooth sizes using the sizes of the upper central incisor, upper and lower first molar, or a combination of these as a reference and using a specific mesiodistal tooth-size table. The results showed that the Digital Method proposed was very accurate in predicting unerupted canine and premolar tooth size. The combination of the sums of the permanent upper central incisor and the lower first molar was the best predictor for canines and premolars in this sample. Upper arch teeth were better predicted than lower arch teeth. The upper lateral incisor provided the worst predictions.

Bernabe E, Flores-Mir C. (2005) [8] performed a study to determine which sum or combination of sums of permanent tooth widths presented the best prediction capability for the SPCP in a Peruvian sample, to calculate a specific linear regression equation for this population, and to evaluate the clinical significance. A total of 150 children with complete permanent dentitions were selected. Fifty more children were used as a validation sample for the application of a multiple linear regression equation (MLRE). They did not present clinically visible dental caries or proximal restorations and no active or previous orthodontic treatment. Their dental casts were measured to 0.1 mm with a sliding caliper with a Vernier scale. Three-way analysis of variance, Pearson Correlation Test, Fisher Z values and a MLRE were used for the statistical analysis. The combination of the sums of permanent upper and lower central incisors and upper first molars was the best predictor for the SPCP in this sample. A MLRE was calculated including sex and arch as additional predictor variables. The MLRE determination coefficient was 60% with a standard error of 0.8 mm. This new MLRE underestimates (less than 1 mm discrepancy) the actual SPCP in only 7% of the cases on the basis of a validation sample.

Materials & Methods

Five hundred sets of dental casts were obtained from children during the school dental health camps in and around Chennai. Thirty sets of sample were removed during the final selection as nine casts were damaged during transportation, eleven casts had one or more teeth partially erupted and ten casts had retained decidous teeth, which did not satisfy the inclusion criteria. The final sample consists of 470 sets of which 127 were girls and 343 were boys.

Standard orthodontic trays were used for impression taking and impressions were taken with alginate material in the usual manner. The impressions were poured in dental stone immediately to reduce any error. [80, 25]

All children were subjected to clinical examination at the start of the study with medical and dental histories taken. The sample criteria include:

1. Indigenous Chennai patients of south Indian descent with fully erupted permanent incisors, permanent canines, and premolars in both maxillary and mandibular arches.

2. The patients had to be free of any systemic disease or serious health problems.

3. Patients with teeth free from restorations, proximal wear, fractures or proximal caries as determined by clinical examination.

4. Patients with teeth free from any hypoplasia or other dental anomalies as in number, size and shape of the tooth

5. A maximum age of 15 years to preclude any discrepancies due to significant proximal wear [25, 107.]

6. High quality dental study casts free from any distortions [4].

Measurement of Mesio-Distal Tooth Widths

- A set of both maxillary and mandibular study casts from each patient was serialized and names kept anonymous.

- A vernier gauge calibrated with digital micrometer whose measuring beaks were sharpened, was used to measure the m-d widths of the individual teeth from unsoaped study casts [110].

- All the teeth from left second premolar through to the right second premolar of each set of dental casts were measured to the nearest 0.01 mm.

- Mesio distal width is measured between two anatomical contact points of each tooth parallel to the occlusal surface of the teeth and also parallel to the vestibular surface of the model [44] .

- When a tooth was rotated or malposed in relation to the dental arch, the measurement was taken between the points on the approximate surface of the crown, where it was judged that normal contact should have occurred with the neighbouring tooth [37].

- All the measurements were recorded to 0.01 mm, and entered on excel spreadsheet.

The sums of the following groups of teeth were pooled and the mean mesio distal diameter was calculated for each sex, and the whole sample:

1. the four mandibular incisors
2. the mandibular canines and premolars per quadrant
3. the maxillary canines and premolars per quadrant

Data analysis

Data collected was than used to evaluate the applicability of regression equations that can be used for the prediction of tooth sizes. Descriptive statistics calculated includes mean, standard deviations, and minimum and maximum values. The statistical techniques employed include:

The Two tailed paired t- tests was used to assess the bilateral symmetry of mesio distal diameter of all measured individual teeth and combined mesio distal diameter of canines and premolars of each arch.

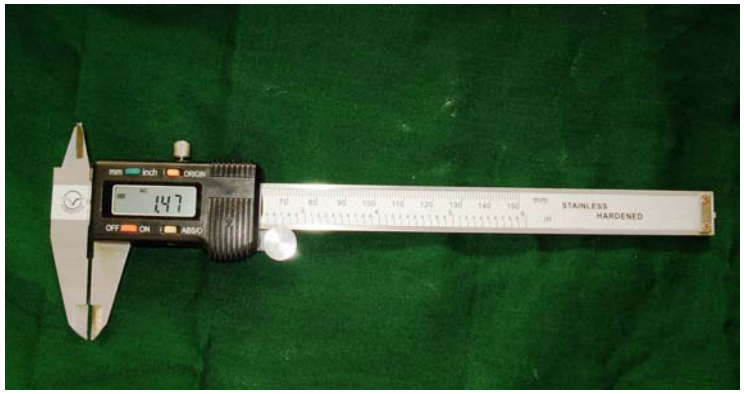
Independent t- tests were used to compare the male and female subjects measured values.

Paired t- test was used to check the significance of the difference between the predicted and measured mesio distal diameter for each method.

Fig.1: ARMAMENTARIUM FOR STUDY MODEL PREPARATION

Fig.2: TAKING THE IMPRESSION

Fig.3: VERNIER GAUGE CALIBRATED WITH DIGITAL MICROMETER



SHARPENED BEAKS

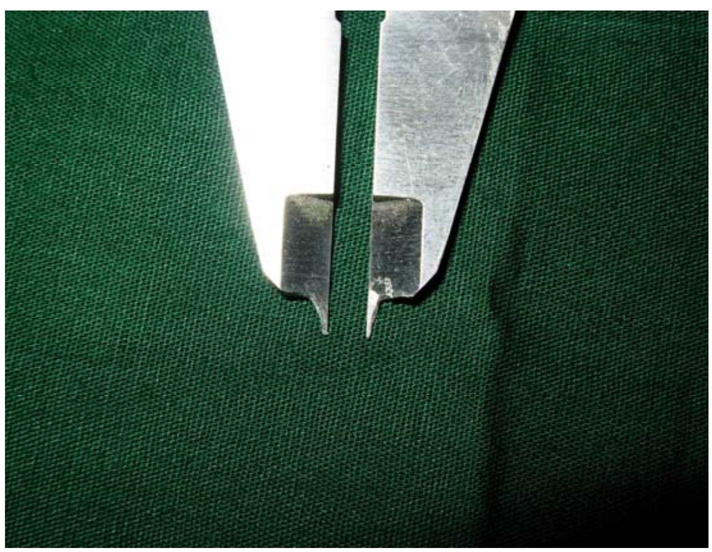
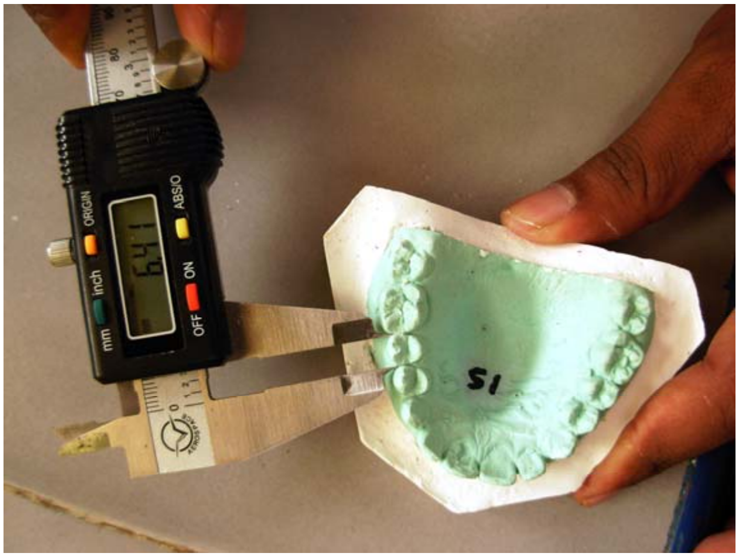


Fig.4: MEASURING MESIODISTAL TOOTH WIDTH WITH CALIPER



Observations & Results

The present study is aimed at evaluating the applicability of the Tanaka and Johnston (1974) and the Moyer's (1988) methods of predicting the size of permanent canines and premolars in Chennai school children. A digital vernier gauge, whose measuring beaks were sharpened, was used to measure the mesio distal widths of the individual teeth in order to increase the accuracy. All the teeth from left first molar through to the right first molar of each set of dental casts were measured to the nearest 0.01 mm.

The values obtained by measuring the four hundred and seventy sets of casts were tabulated in the Table 1.This basic measured data obtained is used for all the regression equations and it is also helpful in providing the Odontometric data of Chennai school children. This table consists of one twenty seven female subjects and three forty three male subjects.

The means and standard deviations of the measured mesio distal widths of the individual teeth are presented for male subjects in Table 2. The measured mean diameter, for Central Incisor was 8.75 ± 0.51, Lateral Incisor 7.04 ± 0.48, Canine 7.88 ± 0.38, First Premolar 7.12 ± 0.38, Second Premolar 6.66 ± 0.46, and First Molar 10.29 ± 0.53, in the maxillary arch and mean diameter for Central Incisor 5.49 ± 0.36, Lateral Incisor 6.09 ± 0.46, Canine 6.93 ± 0.39, First Premolar 7.19 ± 0.35, Second Premolar 7.08 ± 0.38, and First Molar 11.21 ± 0.55 in the mandibular arch.

Table 3 represents the means and standard deviations of the measured mesio distal widths of the individual teeth for female subjects. The measured mean diameter, for Central Incisor was 8.54 ± 0.44, Lateral Incisor 6.79 ± 0.50, Canine 7.50 ±

0.34, First Premolar 6.68 ± 0.28, Second Premolar 6.34 ± 0.28, and First Molar 10.10 ± 0.55 in the maxillary arch and mean diameter for Central Incisor 5.38 ± 0.28, Lateral Incisor 5.98 ± 0.40, Canine 6.69 ± 0.36, First Premolar 6.87 ± 0.29, Second Premolar 6.78 ± 0.37, and First Molar 10.94 ± 0.52 in the mandibular arch.

Table 4 represents the mean bilateral variation of the measured mesio distal diameter for the whole sample (N = 470) which was done by using paired t-test. There was significant bilateral differences ($p<0.05$) found with maxillary lateral incisors (0.01 ± 0.16), maxillary first molars (0.01 ± 0.19) and, mandibular first molars (0.01 ± 0.16). and no statistical difference ($p>0.05$) was found with other teeth.

Table 5 represents the intra – examiner variability data measured from 200 samples, which was ranged from 0.1 millimeters to 0.19 millimeters in the maxillary arch and 0.08 millimeters to 0.13 millimeters in the mandibular arch. The variability was more with the maxillary second premolar (0.01 ± 0.16) and first molars (0.01 ± 0.19) than the other teeth measured.

Table 6 represents inter – examiner variability in a sample of 30 sets. The measurements ranged from 0.07 millimeters to 0.23 millimeters maxillary arch and 0.03 millimeters to 0.19 millimeters in the mandibular arch in which, more amount of variability, was seen with the maxillary central incisors (0.01 ± 0.18), lateral incisors (0.01 ± 0.15) and first molars (0.01 ± 0.23) and, mandibular first molars (0.01 ± 0.19) than the other teeth measured.

Table 7 represents the average mesio distal diameter of measured teeth for the prediction chart. Since the numbers of subjects in the male group are more than the female subjects, independent sample t-tests were performed to compare the mesio distal tooth widths. All the mean differences are statistically significant (0.001) for both the maxillary and mandibular sum values.

Table 8 and graphs 1 to 4 represents the results of the chi-square test for the differences between the sum of mesio distal diameter of canines and premolars in both the arches and the predicted values derived from Moyer’s. Though the measured values of the sum of mesio distal diameter of canines and premolars in both the arches are falling between the 35% and 50%, 50% value were taken into consideration because most of the values are falling nearer to the 50% probability range.

The distribution of sample according to Moyer’s probability in maxilla were as 7 (1.4%) subjects in category 2 (15%Moyer’s probability level), 5 (1.0%) subjects in category 3 (25%Moyer’s probability level), 63 (13.4%) subjects in category 4 (35%Moyer’s probability level), 306 (65.1%) subjects in category 5 (50%Moyer’s probability level), 48 (10.2%) subjects in category 6 (65%Moyer’s probability level) , 16 (3.4%) subjects in category 7 (75%Moyer’s probability level), 9 (1.9%)

subjects in category 8 (85%Moyer's probability level), 16 (3.4%) subjects in category 9 (95%Moyer's probability level) and the distribution for whole subjects in mandible is like 6 (1.2%) subjects in category 2 (15%Moyer's probability level), 16 (3.4%) subjects in category 3 (25%Moyer's probability level), 50 (10.6%) subjects in category 4 (35%Moyer's probability level), 311 (66.1%) subjects in category 5 (50%Moyer's probability level), 62 (13.1%) subjects in category 6 (65%Moyer's probability level) , 11 (2.3%) subjects in category 7 (75%Moyer's probability level), 5 (1.0%) subjects in category 8 (85%Moyer's probability level), 9 (1.9%) subjects in category 9 (95%Moyer's probability level) High statistical significant difference was obtained only at 50% level of Moyer's probability chart and least with 85% level of Moyer's probability chart.

The results of correlation coefficient with Two Tailed significance test of Tanaka and Johnston (1974) showed no significance, but when it is compared with Friedman two way Anova test, the measured values showed a positive correlation at sum of the lower incisors plus 10 [11as according to Tanaka and Johnston (1974)] for maxillary arch and sum of the lower incisors plus 9.5 [10.5 as according to Tanaka and Johnston (1974)] for mandibular arch, but there was overestimation seen in both arches which was represented in Table 9 graphs 5 and 6.

TABLE 1: DATA SHOWING THE MEASURED MESIO DISTAL WIDTHS OF ALL TEETH FOR THE WHOLE SAMPLE

S.NO	SEX	MAXILLA												MANDIBLE											
		RIGHT						LEFT						RIGHT						LEFT					
		C.I	L.I	C	Pm1	Pm2	M	C.I	L.I	C	Pm1	Pm2	M	C.I	L.I	C	Pm1	Pm2	M	C.I	L.I	C	Pm1	Pm2	M
1	M	9.63	7.25	8.53	7.66	7.33	11.29	9.62	7.8	8.41	7.64	7.35	11.51	5.86	6.34	6.93	7.21	7.52	11.76	5.85	6.33	6.85	7.2	7.53	11.74
2	M	9.11	7.58	7.79	7.03	7.22	10.67	9.11	7.16	7.77	7.02	7.06	10.94	5.78	6.18	6.7	7.2	7.71	11.78	5.78	6.18	6.7	7.14	7.69	11.8
3	M	9.07	7.99	8.26	6.98	6.38	11.47	9.17	7.97	8.19	6.94	6.36	10.8	5.36	6.47	6.97	6.93	7.66	11.96	5.56	6.72	6.87	6.93	7.65	11.73
4	F	8.59	6.75	7.56	6.49	6.53	10.11	8.58	7.03	7.55	6.58	6.43	10.36	5.5	5.94	6.58	6.76	6.88	11.66	5.51	6.03	6.64	6.91	6.99	11.94
5	M	8.61	6.96	7.71	7.08	7.19	10.51	8.63	7.04	7.74	7.21	6.91	10.39	5.58	6.38	6.84	7.39	7.26	11.34	5.58	6.37	6.98	7.38	7.12	11.21
6	M	8.22	6.88	7.87	7.09	6.64	10.28	8.22	6.87	7.85	7.02	6.91	10.31	5.35	5.91	7.11	7.01	7.15	11.05	5.74	6.34	7.11	7.09	7.14	11.37
7	M	8.54	7.37	7.95	6.61	6.54	10.06	8.54	7.37	7.95	6.78	6.41	10.08	5.78	6.02	6.82	7.14	6.67	10.83	5.69	5.98	6.74	6.98	7.03	10.72
8	M	8.49	7.08	7.8	7.19	6.08	9.87	8.52	7.08	7.8	7.19	6.11	9.86	5.25	5.9	6.34	7.1	6.71	11.05	5.26	5.91	6.65	7.34	6.83	11.04
9	M	8.61	7.18	7.78	6.64	6.14	9.34	8.62	7.16	7.74	6.64	6.16	9.33	5.31	6.12	7.02	6.75	6.54	10.51	5.37	6.12	6.97	6.96	7.35	9.59
10	M	9.15	7.61	8.09	7.06	7.04	10.38	9.17	7.62	8.06	7.06	6.79	10.72	5.9	6.3	7.45	7.08	7.19	11.07	5.92	6.3	7.42	7.19	7.49	11.55
11	M	8.69	7.12	8.06	6.65	6.3	10.23	8.28	7.18	8.32	6.76	6.56	9.98	5.11	6.08	7.46	6.51	7.26	11.12	5.11	5.86	7.46	6.82	7.25	11.23
12	F	9.23	6.96	7.74	6.58	6.32	10.9	9.25	6.86	7.94	6.98	5.68	10.9	5.45	6.26	6.64	6.92	6.32	11.46	5.45	6.16	6.61	6.96	6.65	11.64
13	M	8.56	7.21	8.15	7.34	7.01	10.66	8.71	7.23	8.15	7.07	6.46	10.66	5.76	5.96	7.35	6.91	6.94	11.21	5.71	5.96	7.35	6.85	7.02	11.28
14	F	8.15	6.98	7.65	6.82	6.5	10.17	8.2	6.84	7.66	7.01	5.95	10.47	5.65	5.85	6.62	7.24	6.77	11.39	5.63	5.85	6.62	7.25	6.92	11.59
15	M	9.52	7.59	8.12	7.63	7.27	10.65	9.52	7.59	8.12	7.65	7.18	10.64	6.16	6.72	7.45	8.09	7.24	12.1	6.16	6.72	7.64	7.5	7.5	12.27
16	M	9.48	7.12	8.43	8.33	7.46	10.69	8.84	7.18	7.46	7.52	7.16	10.84	5.78	6.5	7.1	7.23	7.34	12.18	5.63	6.4	6.93	7.07	7.87	12.3
17	M	9.19	7.12	7.13	7.52	6.72	10.6	9.01	7.16	7.28	7.49	7.16	10.58	5.17	5.91	6.53	7.66	6.92	11.82	5.17	6.19	6.53	7.53	7.11	11.91
18	M	9.1	7.78	8.87	7.99	8.17		8.97	7.72	8.87	8.4	8.11	11.52	5.7	6.59	8	7.92	8.41	12.38	5.64	6.54	7.8	8	8.93	12.15
19	M	8.25	6.4	7.53	6.5	6.38	9.52	8.24	6.41	7.53	6.45	6.46	9.59	5.21	5.74	6.36	7.13	6.83	11.1	5.21	5.54	6.46	6.85	7.13	10.93
20	M	9.08	7.29	7.53	7.73	6.95	11.25	8.84	7.29	7.53	7.72	6.98	11.24	5.98	6.31	7.19	7.3	7.09	11.41	5.98	6.21	7.23	6.92	7.21	11.68
21	M	8.49	6.79	7.53	6.47	6.51	10.72	8.61	6.79	7.51	6.65	6.32	10.75	5.49	5.78	6.85	6.55	6.34	11.22	5.61	5.71	6.71	6.58	6.41	11.22
22	M	9.41	7.18	7.88	7.38	7.02	10.93	9.41	6.69	7.84	7.54	6.85	11.3	5.88	6.35	6.65	7.35	7.35	11.36	5.87	6.32	6.81	7.81	7.56	11.35
23	M	8.36	6.47	7.58	7.93	7.4	10.83	8.36	6.48	7.73	8.01	7.24	11.23	5.84	6.99	7.05	7.65	7.42	11.88	5.88	6.64	7.28	7.65	7.01	12.09
24	M	8.75	7.23	7.98	7.31	6.58	10.16	8.75	6.79	7.85	7.34	6.61	10.05	5.28	6.38	7.34	7.38	6.83	11.84	5.28	6.42	7.34	7.18	6.94	11.55
25	M	8.82	6.9	7.99	7.27	7.33	10.83	8.82	6.9	7.95	7.5	7.29	10.78	6.04	6.63	7.05	7.2	7.91	11.72	6.14	6.55	7.02	7.3	6.93	11.73
26	M	8.35	7.05	7.68	6.18	6	9.9	8.31	7.17	7.87	6.74	6.11	10.27	5.09	5.65	7.12	6.65	6.45	10.73	5.08	5.65	7.13	6.55	6.63	10.74
27	M	8.49	6.55	7.58	6.53	6.57	10.02	8.64	7.01	7.62	6.12	6.58	10.1	5.35	5.67	6.57	6.46	7.23	10.73	5.35	5.5	6.48	6.49	7.37	10.94
28	F	9.59	7.16	7.99	7.06	6.48	10.26		7.11	7.93	7.15	6.51	10.51	6	7.08	7.14	7.32	7.5	12.04	6.37	6.66	7.14	7.44	7.23	11.95
29	M	8.47	6.21	7.39	7.12	6.62	10.7	8.5	5.85	7.39	7.32	6.61	11.18	5.22	5.92	6.45	7.43	7.05	11.35	5.59	5.85	6.52	7.34	7.28	11.68
30	M	9.25	7.14	7.93	7.6	6.39	10.88	9.25	7.11	7.8	7.22	6.44	10.73	5.58	6.29	7.28	7.37	7.12	11.36	5.58	6.42	7.26	7.51	7	11.56
31	M	8.04	7.08	7.39	7	6.43	9.76	8.66	7.13	7.37	6.98	6.48	9.97	5.09	5.46	6.61	7.12	6.53	10.92	5.09	5.46	6.53	6.96	6.86	10.88
32	M	9.38	8.32	8.44	7.38	6.97	10.91	9.18	8.12	8.09	7.6	6.69	11.16	6.15	6.61	7.3	7.4	7.24	11.2	5.76	6.61	7.25	7.68	6.95	11.26
33	F	8.81	6.13	6.84	6.9	5.68	10.26	8.64	6.09	6.82	6.95	5.62	10.84	5.03	5.33	6.33	6.79	6.94	11.33	5.03	5.42	6.24	6.68	6.73	11.36
34	F	8.56	6.56	8.1	5.93	6.35	10.22	8.51	6.56	8.11	6.04	5.99	10.03	5.17	5.85	7.02	6.38	6.4	10.94	5.17	5.8	7.03	6.28	6.52	10.76
35	M	10.7	8.04	7.74	7.57	7.67		10.3	7.58	7.64	7.45	7.81	10.8	6.18	6.82	7.14	7.46	7.91	11.23	6.21	6.82	7.6	7.36	7.82	11.33
36	F	8.47	7.29	7.28	6.82	6.35	10.26	8.55	7.46	7.29	7.1	6.32	10.24	5.34	6.15	6.62	6.97	6.52	10.71	4.95	6.07	6.65	6.78	6.63	10.54
37	M	9.21	7.51	8.95	7.9	5.85	10.84	9.22	7.58	8.9	8.32	5.73	10.95	6.22	6.59	7.68	7.66	6.87	11.63	6	6.56	7.68	7.55	6.99	
38	M	8.83	7.36	7.93	6.92	6.93	10.57	8.98	7.34	7.97	7.09	6.84	10.97	5.7	6.51	6.95	6.81	7.45	11.31	5.7	6.51	6.81	7.04	7.1	11.39
39	F	8.54	7.1	7.58	6.48	6.52	9.85	8.68	7.1	7.58	6.27	6.21	10.34	5.14	5.78	6.56	6.95	6.94	10.98	5.14	5.86	6.56	7.01	7.15	11.1

40	M	9.24	6.84	7.92	7.85	6.41	10.09	9.08	7	8.12	7.24	6.97	10.2	5.84	6.42	7.32	7.25	7.16	11.13	5.88	6.42	7.2	7.44	7.15	10.9
41	M	8.58	6.71	7.52	6.84	6.04	10.47	8.41	6.88	7.47	6.89	6.04	10.64	5.41	5.72	6.65	6.88	7.02	10.6	5.41	5.77	6.69	7.02	6.62	10.31
42	M	8.83	6.27	7.36	6.54	6.63	10.15	8.82	6.57	7.37	6.48	6.62	10.08	5.4	5.76	6.47	6.86	6.71	10.71	5.5	5.96	6.47	6.77	6.73	11.15
43	M	7.91	6.48	7.77	6.66	6.36	10.1	8.12	6.48	7.77	6.86	6.21	10.14	5.06	5.76	6.67	6.92	6.72	10.76	5.03	5.76	6.67	6.9	6.68	11.04
44	M	9.27	7.43	7.68	7.33	7.28	10.41	9	7.43	7.68	7.25	7.28	10.55	5.8	6.39	6.93	7.11	7.13	11.23	5.78	6.41	6.94	7.27	7.34	11.29
45	M	8.59	6.57	7.76	7.28	6.4	10.73	8.59	6.57	7.7	7.18	6.51	10.93	5.58	6.24	6.97	7.37	7.23	11	5.58	6.06	6.97	7.32	7.33	11.21
46	M	8.61	7.03	7.4	7.08	5.95	10.3	8.68	7.38	7.42	7.14	5.91	10.33	5.1	5.66	6.54	6.97	7.16	11.37	5.06	5.66	6.53	6.95	7.41	11.38
47	M	8.78	6.69	7	6.84	6.95	10.02	9.18	6.34	7	6.94	6.75	10.22	5.35	5.41	6.06	7.04	7.33	11.01	5.35	5.41	6.06	6.95	7.08	11.24
48	M	8.1	6.75	7.79	6.7	6.1	10.34	8.1	7.14	7.66	6.63	6.35	10.81	4.92	5.69	7.3	6.86	6.29	10.59	5.09	5.69	7.3	7.13	6.44	10.73
49	M	8.78	7.52	7.24	6.85	6.71	11.03	9.13	6.9	7.2	6.79	6.86	10.98	5.64	6.49	6.34	6.86	7.27	11.72	5.71	6.49	6.26	6.9	7.41	11.79
50	M	8.63	6.16	7.95	7.31	6.34	10.46	8.63	6.83	7.95	7.11	6.5	10.76	5.42	6.25	6.96	7.05	6.97	11.3	5.42	6.33	6.86	7.22	7.2	11.24
51	M	8.71	6.72	7.77	7.03	6	10.77	8.69	6.72	7.82	7.05	6.17	11.16	5.39	5.87	6.6	7.03	7.02	12.01	5.37	5.87	6.59	7.15	7.35	12
52	M	9.26	7.36	8.21	7.32	7.06	10.26	9.42	7.21	8.3	7.36	6.64	10.47	5.64	6.56	7.23	7.36	7.08	10.53	5.82	6.57	7.03	7.48	7.21	10.57
53	M	7.73	6.16	7.35	6.79	6.11	10.25	7.83	5.95	7.29	6.74	6.29	9.98	4.76	5.37	6.39	6.71	6.64	9.84	4.79	5.37	6.41	6.78	6.82	10.49
54	F	9.31	8.14	7.7	6.98	6.46	10.88	9.32	7.52	7.95	7.65	5.3	11.4	5.94	6.43	7.81	6.96	7.18	11.29	5.95	6.74	7.84	7.22	7.74	11.15
55	F	8.79	6.76	7.12	6.89	6.52	10.51	8.79	6.68	6.92	7.14	6.42	10.04	5.64	5.9	6.86	6.88	6.85	11.3	5.6	5.9	6.86	6.87	6.86	11.53
56	M	8.87	6.78	7.85	6.83	6.27	10.19	8.56	6.78	7.85	6.96	6.2	10.62	5.27	5.8	6.6	7.33	7.18	11.23	5.27	5.8	6.57	6.48	7.22	11.54
57	M	8.48	7.03	8.14	6.75	6.57	10.22	8.48	7.05	8.14	6.89	6.34	10.56	5.43	6.1	6.87	6.95	7.1	10.76	5.43	6.12	6.8	7.03	7.24	11.02
58	M	8.61	7.18	7.98	6.94	6.34	9.34	8.62	7.16	7.94	6.94	6.46	9.33	5.31	6.12	7.12	6.95	6.84	10.51	5.37	6.12	6.97	6.96	7.16	9.59
59	M	8.53	6.63	7.92	6.95	6.58	10.28	8.74	6.63	7.92	6.8	6.45	10.78	5.31	5.91	7.01	7.04	6.79	11.37	5.21	5.88	7.01	6.63	7.2	11.44
60	F	8.98	6.54	7.48	7.09	6.62	9.8	8.47	6.56	7.67	6.82	6.31	9.41	5.65	6.91	6.46	7.4	7.66	11.03	5.65	6.65	6.66	7.63	7.64	10.54
61	M	8.14	6.3	7.69	6.88	6.88	10.21	8.09	6.44	7.69	6.98	6.74	10.41	5.16	5.86	6.81	7.27	7.28	11.23	5.08	5.86	6.78	7.55	6.93	11.37
62	F	8.45	7.22	8.09	6.81	7.13	11.05	8.45	7.31	8.25	6.61	6.02	10.72	5.44	5.89	7.21	6.26	7.13	11.44	5.42	6.01	7.21	6.71	6.98	11.04
63	M	8.49	7.08	7.8	7.19	6.08	9.87	8.52	7.08	7.8	7.19	6.11	9.86	5.25	5.9	6.34	7.1	6.71	11.05	5.26	5.91	6.65	7.34	6.83	11.04
64	M	8.73	7.71	8.23	7.9	7.28	11.41	8.71	7.24	8.63	7.92	7.24	11.46	5.7	6.26	7.34	8.07	7.7	12.46	5.76	6.29	7.46	8.1	7.83	12.43
65	M	8.77	6.76	7.83	7.05	6.56	10.38	8.77	6.79	7.83	7.15	6.44	10.89	5.85	6.26	7.73	8.14	8.19	11.84	5.56	6.26	7.73	8.4	8.08	12.08
66	M	7.79	6.48	7	6.76	6.32	10.01	7.62	6.48	7.19	6.92	6.3	9.81	4.9	5.37	6.2	6.86	6.73	10.96	4.92	5.37	6.2	6.92	7.22	10.8
67	F	8.84	7.36	7.69	6.45	6.31	10.25	8.92	7.16	7.72	6.82	6.32	9.82	5.42	6.29	6.83	7.26	7	10.58	5.42	6.6	6.76	6.91	7.17	10.67
68	M	8.68	6.89	8.05	7.43	6.84	10.01	8.6	6.91	7.84	7.38	6.78	10.24	5.24	5.69	7.11	7.38	7.3	11.16	5.26	5.68	6.8	7.39	6.62	11.48
69	M	9.52	7.59	8.12	7.63	7.27	10.65	9.52	7.59	8.12	7.65	7.18	10.64	6.16	6.72	7.45	8.09	7.24	12.1	6.16	6.72	7.64	7.5	7.5	12.27
70	F	8.23	5.64	7.48	6.69	6.34	9.86	8.25	5.38	7.38	6.46	6.24	9.76	5.01	5.69	6.28	6.55	6.43	10.47	5	5.74	6.46	6.65	6.66	10.85
71	M	8.5	6.9	7.31	6.9	5.81	10.16	8.5	6.93	7.33	6.78	6.02	10.03	4.91	5.35	6.35	6.69	6.15	10.37	4.91	5.46	6.46	6.49	6.43	10.47
72	M	7.84	6.04	7.87	6.56	6.55	10.24	7.78	6.15	7.84	7.07	6.96	10.28	4.81	5.71	6.91	7.52	6.72	10.95	5.04	5.73	6.89	7.45	7.04	10.91
73	M	8.37	6.73	7.86	7.28	6.26	10.93	8.37	6.76	7.86	7.25	6.5	10.58	6.02	6.07	7.08	7.14	6.62	11.22	5.48	6.07	7.11	7.16	6.97	11.55
74	M	8.66	6.69	8.02	7.48	7.02	9.48	8.7	6.87	7.93	7.49	7.02	10.16	5.5	5.83	7.13	7.49	7.49	11.41	5.5	5.83	6.93	7.53	7.39	11.25
75	F	8.61	7.18	7.98	6.74	6.24	9.34	8.62	7.16	7.94	6.84	6.26	9.33	5.31	6.12	7.02	6.75	6.44	10.51	5.37	6.12	6.97	6.96	7.35	9.59
76	M	8.83	5.48	8.01	6.97	6.86		8.71	5.48	7.68	6.97	6.96	10.96	5.29	5.76	7.09	7.13	7.11	11.81	5.19	5.78	7.02	7.57	7.74	11.54
77	M	9.75	7.77	7.97	7.38	7.09	11.23	9.75	7.77	7.76	7.52	7.16		5.94	6.44	7.34	7.56	7.07	12.06	6.18	6.54	7.36	7.61	7.01	12.1
78	M	9.19	7.01	8.05	7.62	6.8	11.09	9.18	7.15	8.01	7.45	7.05		6.26	6.68	6.94	7.54	7.48	10.77	6.26	6.66	6.91	7.55	7.53	11.34
79	M	8.04	6.45	7.69	7.14	6.98	9.46	7.96	6.47	7.65	7.13	7.02	9.24	5.52	6.22	6.81	7.39	7.14	10.58	5.52	6.22	6.91	7.29	6.87	10.78
80	M	9.2	8.02	8.97	8.07	8.24		9.07	8.02	9.03	8.25	8.3	11.98	5.79	6.6	7.7	8.08	8.74	12.54	5.79	6.6	7.72	8.11	8.74	12.2
81	M	8.61	7.18	7.98	6.74	6.24	9.34	8.62	7.16	7.94	6.84	6.26	9.33	5.31	6.12	7.22	6.95	6.64	10.51	5.37	6.12	6.97	6.96	7.15	9.59
82	M	8.98	6.54	7.58	7.29	6.82	9.8	8.47	6.56	7.87	7.02	6.61	9.41	5.45	6.76	6.36	7.4	7.66	11.03	5.45	6.5	6.46	7.73	7.44	10.54
83	M	8.49	7.08	7.8	7.19	6.08	9.87	8.52	7.08	7.8	7.19	6.11	9.86	5.25	5.9	6.34	7.1	6.71	11.05	5.26	5.91	6.65	7.34	6.83	11.04
84	F	8.68	7.12	7.78	6.63	6.15	10.07	8.7	7.12	7.78	6.63	6.12	9.57	5.45	6.13	7.18	6.79	6.43	10.38	5.45	6.13	6.84	6.66	7.04	9.62
85	M	9.52	7.59	8.02	7.53	7.17	10.65	9.52	7.59	8.12	7.65	7.18	10.64	6.16	6.72	7.35	7.89	7.14	12.1	6.16	6.72	7.54	7.5	7.4	12.27
86	F	8.98	6.54	7.38	6.99	6.52	9.8	8.47	6.56	7.67	6.82	6.31	9.41	5.45	6.76	6.46	7.2	7.46	11.03	5.45	6.5	6.66	7.63	7.54	10.54
87	M	8.49	7.08	7.8	7.19	6.08	9.87	8.52	7.08	7.8	7.19	6.11	9.86	5.25	5.9	6.34	7.1	6.71	11.05	5.26	5.91	6.65	7.34	6.83	11.04
88	M	8.61	7.18	7.98	6.84	6.44	9.34	8.62	7.16	7.94	6.94	6.46	9.33	5.31	6.12	7.12	6.95	6.74	10.51	5.37	6.12	6.97	6.96	7.15	9.59

89	M	9.52	7.59	8.02	7.53	7.17	10.65	9.52	7.59	8.12	7.65	7.18	10.64	6.16	6.72	7.35	7.89	7.14	12.1	6.16	6.72	7.54	7.5	7.4	12.27
90	M	8.68	7.12	7.78	6.63	6.15	10.07	8.7	7.12	7.78	6.63	6.12	9.57	5.45	6.13	7.18	6.79	6.43	10.38	5.45	6.13	6.84	6.66	7.04	9.62
91	M	9.52	7.59	8.02	7.53	7.17	10.65	9.52	7.59	8.12	7.65	7.18	10.64	6.16	6.72	7.35	7.89	7.14	12.1	6.16	6.72	7.54	7.5	7.4	12.27
92	M	8.61	7.18	7.98	6.84	6.44	9.34	8.62	7.16	7.94	6.94	6.46	9.33	5.31	6.12	7.12	6.95	6.74	10.51	5.37	6.12	6.97	6.96	7.15	9.59
93	M	8.49	7.08	7.8	7.19	6.08	9.87	8.52	7.08	7.8	7.19	6.11	9.86	5.25	5.9	6.34	7.1	6.71	11.05	5.26	5.91	6.65	7.34	6.83	11.04
94	M	8.98	6.54	7.48	7.09	6.62	9.8	8.47	6.56	7.67	6.82	6.31	9.41	5.45	6.76	6.56	7.6	7.86	11.03	5.45	6.5	6.86	7.93	7.64	10.54
95	M	8.68	7.12	7.78	6.63	6.15	10.07	8.7	7.12	7.78	6.63	6.12	9.57	5.45	6.13	7.18	6.79	6.43	10.38	5.45	6.13	6.84	6.66	7.04	9.62
96	M	9.52	7.59	8.02	7.53	7.17	10.65	9.52	7.59	8.12	7.65	7.18	10.64	6.16	6.72	7.35	7.89	7.14	12.1	6.16	6.72	7.54	7.5	7.4	12.27
97	M	8.49	7.08	7.8	7.19	6.08	9.87	8.52	7.08	7.8	7.19	6.11	9.86	5.25	5.9	6.34	7.1	6.71	11.05	5.26	5.91	6.65	7.34	6.83	11.04
98	M	8.61	7.18	7.98	6.84	6.44	9.34	8.62	7.16	7.94	6.94	6.46	9.33	5.31	6.12	7.12	6.95	6.74	10.51	5.37	6.12	6.97	6.96	7.15	9.59
99	M	9.52	7.59	8.02	7.53	7.17	10.65	9.52	7.59	8.12	7.65	7.18	10.64	6.16	6.72	7.35	7.89	7.14	12.1	6.16	6.72	7.54	7.5	7.4	12.27
100	M	9.03	6.79	8.05	7.15	6.65	10.62	9.06	7.01	7.85	7.09	7.01	10.68	5.71	6.37	7.22	7.39	7.35	11.52	5.7	6.36	7.22	7.45	7.58	11.63
101	F	8.67	7.04	7.8	6.55	6.09	10.16	8.66	6.9	7.68	6.71	6.2	9.49	5.32	6.08	6.97	6.61	6.81	10.56	5.32	6.09	6.87	6.68	7.03	
102	F	8.51	7.26	7.18	6.81	6.6	10.24	8.51	7.26	7.18	6.76	6.55	10.53	5.57	5.84	6.38	7.18	6.76	11.35	5.6	5.83	7.08	6.75	6.76	11.33
103	M	8.94	6.86	7.63	7.26	7.04	9.76	9.03	7.12	7.63	7.25	7.1	9.94	5.75	6.21	7.06	6.84	7.56	10.87	5.8	6.2	7.07	7.01	7.51	10.44
104	M	9.02	6.87	7.37	6.63	6.29	10.41	9.02	7.33	7.49	6.6	6.34	10.45	5.18	5.48	6.62	6.91	6.62	10.91	5.2	5.61	6.56	6.83	6.52	10.99
105	M	8.19	7.27	7.9	6.85	6.68	10.28	8.79	6.83	7.7	6.91	6.47	10.87	5.2	6.04	7.17	7.14	7.23	11.7	5.33	5.83	6.85	7.08	6.92	11.38
106	F	7.74	6.86	7.63	6.78	6.19	10.41	7.86	6.92	7.79	6.71	6.24	10.61	5.26	5.91	7.1	6.61	6.59	11.21	5.24	5.97	7.11	6.6	6.67	11.17
107	M	8.63	6.67	8.02	7.07	6.57	9.78	8.71	7.23	7.93	7.3	6.59	9.53	5.28	5.97	6.94	6.86	7.06	11.53	5.31	5.98	6.85	7.05	7.08	11.45
108	M	9.11	6.91	7.93	6.4	6.92	9.57	8.75	6.81	7.99	6.4	6.67	9.92	5.22	6.01	6.84	6.97	6.97	10.82	5.22	6.19	6.85	6.7	6.99	10.87
109	F	7.47	5.71	6.6	6.75	6.31	9.91	7.5	5.66	6.45	6.94	6.29	9.9	4.85	5.45	6.15	6.64	6.19	11.1	4.86	5.35	6.05	6.45	6.79	11.19
110	M	8.12	7.36	7.99	7.19	6.99	10.62	8.27	7.36	8.13	7.19	7.12	11.31	5.91	6.24	7.09	7.63	7.51	11.66	5.91	6.34	7.02	7.68	7.53	11.77
111	F	8.47	6.72	7.51	6.24	6.29	9.62	8.32	6.7	7.51	6.3	6.48	9.64	5.24	5.43	6.29	6.78	6.78	11.23	5.24	6.14	6.56	6.62	6.64	11.8
112	F	7.84	6.41	7.02	6.23	5.78	8.78	7.93	6.47	7.27	6.46	5.86	8.72	4.43	5.28	5.84	6.47	6.04	10.31	4.43	5.28	6.15	6.76	6.19	10.59
113	F	7.86	6.7	7.43	6.89	6.13	9.3	8.49	6.7	7.82	6.79	5.84	9.29	5.67	5.88	6.71	6.76	6.45	10.66	5.69	5.89	6.61	6.87	6.6	10.46
114	F	8.05	6.09	7.18	6.64	6.46	9.81	8.13	6.02	7.19	6.6	6.45	9.95	5.44	5.58	6.24	6.97	6.67	11.78	5.44	5.52	6.29	7.02	6.58	11.71
115	M	9.32	7.48	8.31	7.12	7.02	10.77	9.34	7.65	8.2	7.1	7.02	10.38	5.65	6.67	7.56	7.31	7.3	11.66	5.65	6.74	7.56	7.64	7.05	11.67
116	M	9.18	7.78	8.12	7.62	6.44	10.76	9.14	7.69	8.09	7.62	6.51	10.67	5.99	6.18	7.26	7.13	7.25	11.69	5.95	6.18	7.36	7.16	7.11	11.69
117	F	8.51	6.66	7.57	6.29	6.24	9.46	8.39	6.82	7.72	6.32	6.01	10.07	5.47	5.57	6.45	6.54	6.78	10.24	5.46	5.54	6.46	6.57	6.71	10.27
118	M		6.33	7.61	7.02	6.48	9.88	8.84	6.44	7.73	7.08	6.46	10.24	5.49	5.82	6.81	7.18	6.92	11.27	5.45	5.81	6.8	7.23	6.97	11.45
119	M	8.3	6.52	8.12	7.25	6.51	10.06	8.37	5.98	8.14	7.26	6.92		5.62	6.29	6.81	6.72	6.55	10.28	5.63	6.29	6.92	6.92	6.64	10.28
120	M	8.81	6.97	7.98	7.23	6.99	10.4	8.8	6.92	7.98	6.98	7	10.51	5.74	6.17	6.98	7.35	7.19	11.29	5.74	6.15	7.07	7.42	7.46	11.67
121	F	8.35	7.35	7.58	6.64	6.16	9.68	8.35	7.41	7.31	6.65	6.39	9.66	5.18	6.27	6.61	6.87	7.05	10.76	5.18	6.31	6.71	6.81	6.83	10.84
122	M	8.76	7.03	8.04	7.04	6.56	9.97	8.77	7.14	8.04	6.92	6.86	9.96	5.45	6.27	7.2	7.21	7.1	11.06	5.45	6.24	6.93	7.3	6.97	11.26
123	M	9.15	7.06	7.39	6.74	6.43	10.47	8.91	6.78	7.47	7.07	6.74	9.8	5.53	5.92	7.03	7.02	7.26	10.89	5.58	5.99	6.96	7.02	7.8	10.93
124	F	8.13	6.5	7.15	7.11	5.87	9.38	8.17	6.34	7.14	7.1	5.84	9.36	5.09	5.64	6.27	6.85	6.62	10.32	5.07	5.63	6.24	6.87	6.65	10.28
125	F	8.78	6.53	7.6	6.64	6.28	10.43	8.76	6.61	7.58	7.21	5.84	10.18	5.5	6.09	7.03	7.18	6.44	11.01	5.56	6.12	7.14	7.18	6.34	11.04
126	M	8.46	6.55	7.25	6.78	6.34	10.53	8.44	6.61	7.2	6.71	6.37	10.68	5.25	5.29	6.23	7.15	6.78	11.43	5.25	5.29	6.42	6.87	6.56	11.22
127	M	8.84	7.59	7.96	6.79	6.32	9.79	8.71	7.59	7.91	6.95	6.47	10.15	5.5	6.04	7.16	6.94	6.86	10.23	5.56	6.04	7.07	6.96	6.86	10.29
128	M	9.2	7.02	8.12	7.31	7.01	10.9	9.18	7.12	8.19	7.32	6.97	10.96	5.83	6.54	7.45	7.3	7.31	11.29	6.14	6.42	7.48	7.46	7.51	11.71
129	F	8.83	6.53	8.09	5.92	6.27	10.36	8.73	6.54	8.1	6.12	5.9	10.18	5.25	6.02	7.06	6.53	6.39	10.68	5.28	6.01	7.05	6.11	6.89	10.78
130	M	8.84	7.26	8.14	7.11	6.56	10.12	8.82	7.54	8.16	7.08	6.57	9.82	5.74	6.28	7.33	7.12	6.95	11.69	5.69	6.41	7.13	7.18	7.03	11.79
131	M	7.88	7.52	8.13	7.02	7.28	10.03	7.81	7.69	8.12	6.83	7.14	9.76	5.12	5.67	7.1	7.79	7.42	10.46	5.12	5.65	6.94	7.38	7.24	10.61
132	M	9.81	8.13	7.83	7.68	7.03	11.62	9.89	8.17	8.22	7.63	6.82	11.67	5.85	7.03	6.98	7.9	7.47	12.72	5.84	7.03	7.04	7.99	7.42	12.69
133	M	9.72	7.76	8.69	7.27	6.16	10.6	9.76	7.62	8.7	7.35	6.17	10.67	5.61	6.6	7.31	7.45	6.82	11.71	5.6	6.6	7.33	7.45	6.98	11.7
134	M	8.33	6.39	8.43	7.54	6.71	9.75	8.34	6.39	8.04	7.43	6.11	10.03	5.67	6.05	6.82	7.13	7.22	11.77	5.78	6.02	6.99	7.25	7.02	11.77
135	M	8.35	7.09	8.08	6.79	6.46	9.78	8.33	7.01	8.08	6.76	6.48	9.79	5.45	6.09	6.94	7.01	7.19	10.04	5.55	6.07	6.8	6.96	6.98	9.95
136	M	7.86	7.11	7.28	6.61	6.38	9.18	7.86	6.27	7.39	6.83	6.06	9.02	4.96	5.48	6.78	6.76	6.77	10.25	4.95	5.51	6.68	6.8	6.85	10.54
137	F	7.86	6.81	7.33	6.89	6.79	11.17	8.04	6.59	7.46	6.87	6.62	10.47	5.37	6.19	6.68	7.09	7.08	12.26	5.37	6.09	6.77	7.15	7.06	12.06

138	M	9.43	7.42	8.27	7.16	7.27	10.18	9.29	7.41	8.38	7.72	6.61	10.09	6.21	6.47	7.19	7.44	7.51	10.72	6.27	6.62	7.39	7.58	7.14	11
139	M	8.82	6.52	8.2	7.09	6.69	10.21	8.83	6.47	8.25	7.04	6.64	10.27	6.04	6.03	6.97	7.18	7.47	11.79	5.88	6.03	7.07	7.08	7.42	12.05
140	M		7.67	8.04	7.28	6.27	9.99	8.65	7.3	8.06	7.35	6.31	10.03	5.29	3.18	7.29	7.48	6.52	10.99	5.28	6.78	7.26	7.2	6.99	10.76
141	M	8.76	7.12	9.02	6.83	6.35	10.32	8.77	7.34	8.68	7.28	6.33	10.12	5.88	6.84	7.52	7.28	7.28	11.46	5.9	6.42	7.36	7.41	7.35	11.35
142	F	8.61	7.02	7.82	6.61	6.09	9.68	8.6	7.03	7.85	6.57	6.09	9.32	5.42	6.02	6.84	6.74	6.81	10.36	5.41	6.05	6.85	6.72	6.81	9.98
143	F	8.06	6.07	6.89	6.11	5.79	8.88	7.95	6.04	6.84	6.14	5.88	9.1	4.82	5.32	6.34	6.36	6.11	10.01	4.82	5.08	6.34	6.28	6.14	10.12
144	M	8.64	7.36	7.82	7.28	6.23	10.31	8.65	6.84	7.78	7.1	6.56	10.08	5.39	6.18	6.72	6.94	7.45	11.25	5.38	6.02	6.77	7.02	7.01	11.6
145	M	8.28	6.14	7.78	6.78	6.71	9.66	8.17	6.13	7.71	6.57	6.66	9.75	5.3	5.79	6.8	6.98	6.63	11.31	5.3	5.71	6.71	6.98	6.73	11.23
146	M	9.12	6.79	8.18	7.05	6.95	11.14	9.11	6.58	8.18	7.08	6.93	10.41	5.87	6.63	7.5	7.1	7.11	11.71	5.87	6.63	7.7	7.64	7.35	11.61
147	M	8.14	6.56	7.55	7.2	6.67	10.1	8.01	6.09	7.52	7.16	6.55	10.41	5.21	5.84	6.5	7.21	7.39	11.67	5.23	5.15	6.49	7.16	7.31	11.6
148	M	8.53	6.94	7.67	6.69	6.38	10.04	8.14	6.95	7.67	6.67	6.43	10.16	5.72	6.02	6.81	7.18	7.05	11.35	5.76	6.01	6.78	7.09	7.1	11.41
149	M	8.72	6.63	7.92	6.69	6.61	10.86	8.71	6.98	7.92	6.88	6.38	11.41	5.29	5.9	6.92	6.98	6.88	11.66	5.28	5.84	6.95	6.85	6.82	11.77
150	M	8.32	6.89	7.63	6.4	6.26	9.35	8.41	7.15	7.64	6.46	6.24	9.2	5.26	5.04	6.35	6.93	6.96	10.5	5.05	5.4	6.35	6.92	6.97	10.45
151	F	9.03	6.86	7.49	6.39	6.13	9.96	8.99	6.73	7.22	6.54	6.35	9.51	5.43	5.31	6.45	6.5	6.74	10.07	5.43	5.37	6.35	6.5	6.8	11.21
152	M	8.49	7.08	7.8	7.19	6.08	9.87	8.52	7.08	7.8	7.19	6.11	9.86	5.25	5.9	6.54	7.2	6.81	11.05	5.26	5.91	6.65	7.34	6.83	11.04
153	M	9.23	7.78	8.29	7.25	6.42	9.9	9.22	7.51	8.25	7.3	6.56	10.01	6.05	6.07	7.51	7.07	7.09	11.88	6.05	6.31	7.32	7.25	7.12	11.76
154	M	8.73	7.61	8.28	6.82	6.57	10.27	8.69	7.35	8.09	6.85	6.73	10.01	5.25	6.41	6.47	7.69	7.05	11.5	5.23	6.65	6.6	7.4	7.31	11.43
155	M	7.41	6.35	7.03	6.2	6.36	8.89	7.37	6.36	6.95	6.26	6.28	8.95	4.54	5.18	6.33	6.43	6.61	10.49	4.55	5.18	6.22	6.42	6.71	10.45
156	M	8.63	7.2	7.94	7.31	6.1	10.71	8.38	6.9	7.92	7.42	6.14	10.69	5.4	6.01	6.78	6.91	7.12	11.68	5.4	6.01	6.82	7.27	7.21	11.76
157	M	9.21	7.14	7.98	7.05	6.96	10.09	9.03	6.85	8.12	7.04	6.71	10.05	5.38	6.43	7.14	7.25	6.96	11.55	5.64	6.43	7.04	7.33	7.13	11.86
158	M	8.41	7.18	7.9	7.07	6.32	9.86	8.42	6.83	7.81	7.12	6.32	9.82	5.31	6.03	6.56	7.3	6.81	10.29	5.31	6.01	6.46	7.29	6.72	10.2
159	M	7.78	6.57	7.41	6.54	6.29	9.7	7.83	6.58	7.44	6.59	6.19	9.76	4.71	5.66	6.47	6.56	6.9	10.55	5.02	5.67	6.46	6.59	6.87	10.52
160	M	8.82	6.08	7.59	6.81	6.72	9.45	8.81	6.26	7.64	6.98	6.63	9.41	5.36	5.85	6.27	7.41	7.31	11.32	5.36	5.86	6.38	7.42	7.36	11.32
161	M	8.82	7.94	8.52	6.98	7.16	10.65	9	7.99	8.54	7.49	6.94	11	6.01	6.92	7.43	7.2	7.63	10.6	6.06	6.92	7.4	7.31	7.66	11.07
162	M	9.06	7.67	8.06	7.32	6.73	10.64	8.97	7.48	8.06	7.31	6.83	10.64	5.59	6.63	7.36	7.07	7.21	11.35	5.58	6.63	7.37	7.18	7.03	11.38
163	M	8.68	7.27	8.02	7.14	6.76	11.3	8.71	7.25	8.06	7.16	6.73	11.17	5.78	6.3	7.26	7.25	7.02	11.69	5.71	6.3	7.17	7.49	6.79	11.79
164	F	8.73	7.28	7.25	6.76	6.21	10.12	8.41	6.81	7.27	6.72	6.26	9.78	5.07	5.73	6.37	6.83	6.79	11.09	5.07	6.07	6.47	6.96	6.39	11.02
165	M	9.08	7.16	8.3	7.91	6.8	10.29	9.06	7.29	8.38	8.01	7.35	10.96	5.68	5.86	7.62	7.43	7.7	11.7	5.68	6.12	7.82	7.6	8.03	11.7
166	M	8.99	7.31	7.63	7.62	6.77	10.48	8.89	7.76	7.61	7.57	6.72	10.69	5.48	6.36	7.28	7.17	6.99	11.04	5.48	6.41	7.28	7.22	6.94	10.84
167	M	8.47	6.64	7.83	7.13	6.8	10.05	8.45	6.64	7.93	7.28	6.34	10.05	5.18	5.62	7.27	7.25	7.74	11.28	5.18	5.62	6.96	7.62	8.21	11.33
168	M	9.27	6.16	8.06	6.85	6.67	10.3	9.01	6.16	8.28	6.86	6.19	10.18	5.32	6.03	7.06	7.06	7.02	11.27	5.32	6.15	7.04	7.03	7.01	11.3
169	M	9.23	7.34	9.12	7.91	7.39	11.03	9.63	6.99	9.12	8.1	7.6	11.03	6.09	6.68	7.75	7.98	7.3	12.07	6.09	6.68	7.92	8.14	7.95	12.07
170	M	8.99	6.88	8.42	6.78	6.37	10.62	8.99	6.88	8.33	6.72	6.31	10.75	5.61	5.8	6.96	7.1	6.84	11.58	5.6	5.78	6.97	7.05	6.54	11.56
171	M	10.17	7.95	8.47	6.79	6.76	10.7	9.62	7.95	8.39	6.99	6.85	10.7	5.76	6.38	7.1	7.12	7.37	11.75	5.86	6.38	7	7.16	7.36	11.24
172	M	8.92	6.42	7.26	6.45	6.36	9.65	8.92	6.92	7.24	6.44	6.45	9.6	4.9	5.48	6.24	6.48	7.05	9.94	4.85	5.33	6.33	6.58	7.01	10.09
173	M	9	7.47	7.77	6.88	6.93	9.46	8.99	7.54	7.78	6.87	6.88	9.53	5.45	6	6.57	7.15	6.96	11.2	5.45	6	6.68	7.42	7.06	11.19
174	M	7.99	6.46	7.38	6.9	6.38	10.04	7.99	6.46	7.38	6.59	6.8	10.1	4.94	5.69	6.56	6.88	6.87	10.27	4.94	5.7	6.56	6.91	6.99	10.51
175	M	8.85	7.22	8.11	7.06	6.81	10.85	8.65	7.06	8.12	6.93	6.97	10.85	5.51	6.44	7.23	7.15	7.04	11.55	5.51	6.34	7.24	7.14	7.07	12.06
176	F	8.36	6.66	7.38	6.88	6.45	10.43	8.11	6.43	7.43	6.84	6.62	10.36	5.69	6.22	6.7	7.29	6.87	10.26	5.69	6.22	6.7	7.32	6.83	10.4
177	M	8.95	7.39	7.5	7.05	6.54	9.69	8.95	7.4	7.52	6.99	6.65	9.89	5.31	5.69	6.46	7.1	6.85	10.16	5.35	5.69	6.46	7.11	7.08	10.44
178	F	8.58	6.18	7.62	6.83	6.54	10.95	8.6	6.18	7.72	6.83	6.43	10.79	5.62	6.36	7.22	7.17	7.04	11.56	5.87	6.4	7.13	7.22	7.18	11.2
179	M	9.56	7.05	8.11	7.35	6.59	10.14	9.66	7.05	8.12	7.13	6.65	10.45	5.65	6.38	7.18	7.34	7.01	10.42	5.65	6.15	7.16	7.34	6.97	11.27
180	M	8.3	6.87	7.68	7	6.87	10.7	8.26	6.89	7.72	6.86	6.83	10.7	5.36	6.01	6.83	7.1	6.93	11.32	5.32	6.01	6.88	7.23	6.77	11.45
181	M	8.61	7.18	7.98	6.84	6.34	9.34	8.62	7.16	7.94	6.84	6.26	9.33	5.21	6.02	7.12	6.95	6.74	10.51	5.27	6.02	6.97	6.86	6.85	9.59
182	F	8.68	7.12	7.88	6.73	6.15	10.07	8.7	7.12	7.88	6.73	6.12	9.57	5.55	6.18	7.18	6.79	6.63	10.38	5.55	6.18	7.04	6.76	7.04	9.62
183	M	8.49	7.08	7.8	7.19	6.08	9.87	8.52	7.08	7.8	7.19	6.11	9.86	5.25	5.9	6.54	7.3	6.71	11.05	5.26	5.91	6.65	7.34	6.83	11.04
184	M	9.52	7.59	8.12	7.53	7.17	1065	9.52	7.59	8.12	7.65	7.18	10.64	6.16	6.72	7.45	7.79	7.14	12.1	6.16	6.72	7.44	7.5	7.5	12.27
185	F	8.98	6.54	7.48	6.89	6.42	9.8	8.47	6.56	7.67	6.82	6.31	9.41	5.45	6.76	6.46	7.4	7.56	11.03	5.45	6.5	6.66	7.63	7.54	10.54
186	M	9.9	8.09	8.16	7.3	7.22	11.03	9.67	8.69	8.1	7.36	7.2	11.03	6.08	6.68	7.37	7.23	7.51	12.02	6.08	6.8	7.61	7.25	7.37	11.98

187	F	8.82	7.58	7.66	6.68	6.38	10.76	8.84	7.48	7.68	6.84	6.78	10.04	5.41	6.01	6.89	7.09	7.27	11.02	5.68	6.98	6.93	7.23	7.32	10.99
188	F	8.98	6.89	7.43	7.03	6.28	10.21	8.98	6.7	7.46	6.99	6.46	10.72	5.58	6.08	6.63	7.22	6.8	10.26	5.58	6.35	6.68	7.12	6.64	10.59
189	M	9.04	7.02	7.54	7.03	6.54	10.32	9.04	7.03	7.64	7.16	6.34	10.32	5.54	5.8	6.34	6.98	6.97	10.22	5.54	5.8	6.34	6.95	7	11.34
190	M	8.99	7.25	7.87	7.08	6.92	10.58	8.99	7.36	7.82	7.08	6.86	10.58	5.66	6.27	7.13	6.88	6.68	10.73	5.78	6.13	7.13	7.06	7.06	10.47
191	M	8.38	6.93	7.15	7.38	6.95	10.23	8.38	6.93	7.06	7.36	6.84	10.56	5.4	6.09	6.38	7.4	7.39	11.31	5.55	6.03	6.28	7.48	7.35	11.18
192	F	8.54	6.58	6.86	6.95	6.5	9.37	8.53	6.87	7.27	6.93	6.13	9.96	5.28	5.94	6.39	7.3	6.78	10.89	5.28	5.93	6.39	6.83	6.67	10.86
193	F	7.74	6.39	7.03	6.51	6.34	8.7	7.71	6.38	7.09	6.41	6.33	8.86	5.03	5.5	6.54	6.38	6.48	11.05	5.03	5.5	6.5	6.47	6.48	11.47
194	M	8.06	7.05	7.3	6.72	6.29	10.16	8.13	7.02	7.27	6.64	6.55	9.69	5.03	5.4	6.45	6.51	6.5	10.95	4.98	5.4	6.45	6.55	6.38	10.74
195	M	8.74	6.76	6.97	7.15	6.15	10.12	8.74	6.95	7.2	6.94	6.22	10.17	5.35	5.92	6.89	7.17	7.41	10.18	5.35	5.92	6.89	7.24	7.43	10.55
196	F	8.96	6.29	7.26	6.49	6.38	10.36	8.62	6.79	7.09	6.4	6.31	10.28	5.26	6.02	6.25	6.88	6.71	11.27	5.26	5.6	6.25	6.88	7.04	11.12
197	F	7.92	6.33	7.66	6.35	6.04	9.96	7.92	6.33	7.67	6.37	6.09	9.71	5.21	5.69	6.42	6.76	6.52	10.54	5.25	5.66	6.53	6.76	6.51	11.18
198	F	7.88	6.34	7.69	6.34	6.05	9.94	7.88	6.31	7.62	6.37	6.01	9.91	5.1	5.42	6.32	6.47	6.32	10.56	5.14	5.35	6.54	6.49	6.21	11.16
199	F	8.12	7.28	7.69	6.69	6.61	10.11	8.18	7.28	7.62	6.72	6.6	9.99	5.91	6.2	6.42	7.2	7.31	11.46	5.91	6.2	6.38	7.13	7.32	11.56
200	M	8.66	6.69	8.02	7.48	7.02	9.48	8.7	6.87	7.93	7.49	7.02	10.16	5.5	5.83	7.13	7.49	7.49	11.41	5.5	5.83	6.93	7.53	7.39	11.25
201	M	8.49	7.08	7.8	7.19	6.08	9.87	8.52	7.08	7.8	7.19	6.11	9.86	5.25	5.9	6.54	7.3	6.71	11.05	5.26	5.91	6.65	7.34	6.83	11.04
202	M	8.83	5.48	8.01	6.97	6.86		8.71	5.48	7.68	6.97	6.96	10.96	5.29	5.76	7.09	7.13	7.11	11.81	5.19	5.78	7.02	7.57	7.74	11.54
203	M	8.49	7.08	7.8	7.19	6.08	9.87	8.52	7.08	7.8	7.19	6.11	9.86	5.25	5.9	6.54	7.3	6.71	11.05	5.26	5.91	6.65	7.34	6.83	11.04
204	M	8.61	7.18	7.98	6.84	6.34	9.34	8.62	7.16	7.94	6.84	6.26	9.33	5.21	6.02	7.12	6.95	6.74	10.51	5.27	6.02	6.97	6.86	6.85	9.59
205	M	8.04	6.45	7.69	7.14	6.98	9.46	7.96	6.47	7.65	7.13	7.02	9.24	5.52	6.22	6.81	7.39	7.14	10.58	5.52	6.22	6.91	7.29	6.87	10.78
206	M	8.61	7.18	7.98	6.84	6.34	9.34	8.62	7.16	7.94	6.84	6.26	9.33	5.21	6.02	7.12	6.95	6.74	10.51	5.27	6.02	6.97	6.86	6.85	9.59
207	M	8.49	7.08	7.8	7.19	6.08	9.87	8.52	7.08	7.8	7.19	6.11	9.86	5.25	5.9	6.54	7.3	6.71	11.05	5.26	5.91	6.65	7.34	6.83	11.04
208	M	9.52	7.59	8.12	7.53	7.17	10.65	9.52	7.59	8.12	7.65	7.18	10.64	6.16	6.72	7.45	7.79	7.14	12.1	6.16	6.72	7.44	7.5	7.5	12.27
209	M	8.61	7.18	7.98	6.84	6.34	9.34	8.62	7.16	7.94	6.84	6.26	9.33	5.21	6.02	7.12	6.95	6.74	10.51	5.27	6.02	6.97	6.86	6.85	9.59
210	M	8.49	7.08	7.8	7.19	6.08	9.87	8.52	7.08	7.8	7.19	6.11	9.86	5.25	5.9	6.54	7.3	6.71	11.05	5.26	5.91	6.65	7.34	6.83	11.04
211	M	8.98	6.54	7.48	6.89	6.42	9.8	8.47	6.56	7.67	6.82	6.31	9.41	5.45	6.76	6.46	7.4	7.56	11.03	5.45	6.5	6.66	7.63	7.54	10.54
212	M	8.61	7.18	7.98	6.84	6.34	9.34	8.62	7.16	7.94	6.84	6.26	9.33	5.21	6.02	7.12	6.95	6.74	10.51	5.27	6.02	6.97	6.86	6.85	9.59
213	M	8.49	7.08	7.8	7.19	6.08	9.87	8.52	7.08	7.8	7.19	6.11	9.86	5.25	5.9	6.54	7.3	6.71	11.05	5.26	5.91	6.65	7.34	6.83	11.04
214	M	9.52	7.59	8.12	7.53	7.17	10.65	9.52	7.59	8.12	7.65	7.18	10.64	6.16	6.72	7.45	7.79	7.14	12.1	6.16	6.72	7.44	7.5	7.5	12.27
215	M	8.49	7.08	7.8	7.19	6.08	9.87	8.52	7.08	7.8	7.19	6.11	9.86	5.25	5.9	6.54	7.3	6.71	11.05	5.26	5.91	6.65	7.34	6.83	11.04
216	M	8.61	7.18	7.98	6.84	6.34	9.34	8.62	7.16	7.94	6.84	6.26	9.33	5.21	6.02	7.12	6.95	6.74	10.51	5.27	6.02	6.97	6.86	6.85	9.59
217	M	8.98	6.54	7.48	6.89	6.42	9.8	8.47	6.56	7.67	6.82	6.31	9.41	5.45	6.76	6.46	7.4	7.56	11.03	5.45	6.5	6.66	7.63	7.54	10.54
218	M	8.49	7.08	7.8	7.19	6.08	9.87	8.52	7.08	7.8	7.19	6.11	9.86	5.25	5.9	6.54	7.3	6.71	11.05	5.26	5.91	6.65	7.34	6.83	11.04
219	M	9.63	7.25	8.53	7.66	7.33	11.29	9.62	7.8	8.41	7.64	7.35	11.51	5.86	6.34	6.93	7.21	7.52	11.76	5.85	6.33	6.85	7.2	7.53	11.74
220	M	8.49	7.08	7.8	7.19	6.08	9.87	8.52	7.08	7.8	7.19	6.11	9.86	5.25	5.9	6.54	7.3	6.71	11.05	5.26	5.91	6.65	7.34	6.83	11.04
221	M	9.07	7.99	8.26	6.98	6.38	11.47	9.17	7.97	8.19	6.94	6.36	10.8	5.36	6.47	6.97	6.93	7.66	11.96	5.56	6.72	6.87	6.93	7.65	11.73
222	F	8.59	6.75	7.56	6.49	6.53	10.11	8.58	7.03	7.55	6.58	6.43	10.36	5.5	5.94	6.58	6.76	6.88	11.66	5.51	6.03	6.64	6.91	6.99	11.94
223	M	8.61	6.96	7.71	7.08	7.19	10.51	8.63	7.04	7.74	7.21	6.91	10.39	5.58	6.38	6.84	7.39	7.26	11.34	5.58	6.37	6.98	7.38	7.12	11.21
224	M	8.22	6.88	7.87	7.09	6.64	10.28	8.22	6.87	7.85	7.02	6.91	10.31	5.35	5.91	7.11	7.01	7.15	11.05	5.74	6.34	7.11	7.09	7.14	11.37
225	M	8.61	7.18	7.98	6.84	6.34	9.34	8.62	7.16	7.94	6.84	6.26	9.33	5.21	6.02	7.12	6.95	6.74	10.51	5.27	6.02	6.97	6.86	6.85	9.59
226	F	8.98	6.54	7.48	6.89	6.42	9.8	8.47	6.56	7.67	6.82	6.31	9.41	5.45	6.76	6.46	7.4	7.56	11.03	5.45	6.5	6.66	7.63	7.54	10.54
227	M	8.49	7.08	7.8	7.19	6.08	9.87	8.52	7.08	7.8	7.19	6.11	9.86	5.25	5.9	6.54	7.3	6.71	11.05	5.26	5.91	6.65	7.34	6.83	11.04
228	M	9.15	7.61	8.09	7.06	7.04	10.38	9.17	7.62	8.06	7.06	6.79	10.72	5.9	6.3	7.45	7.08	7.19	11.07	5.92	6.3	7.42	7.19	7.49	11.55
229	M	8.69	7.12	8.06	6.65	6.3	10.23	8.28	7.18	8.32	6.76	6.56	9.98	5.11	6.08	7.46	6.51	7.26	11.12	5.11	5.86	7.46	6.82	7.25	11.23
230	F	9.23	6.96	7.74	6.58	6.32	10.9	9.25	6.86	7.94	6.98	5.68	10.9	5.45	6.26	6.64	6.92	6.32	11.46	5.45	6.16	6.61	6.96	6.65	11.64
231	M	8.56	7.21	8.15	7.34	7.01	10.66	8.71	7.23	8.15	7.07	6.46	10.66	5.76	5.96	7.35	6.91	6.94	11.21	5.71	5.96	7.35	6.85	7.02	11.28
232	F	8.15	6.98	7.65	6.82	6.5	10.17	8.2	6.84	7.66	7.01	5.95	10.47	5.65	5.85	6.62	7.24	6.77	11.39	5.63	5.85	6.62	7.25	6.92	11.59
233	M	9.52	7.59	8.12	7.63	7.27	10.65	9.52	7.59	8.12	7.65	7.18	10.64	6.16	6.72	7.45	8.09	7.24	12.1	6.16	6.72	7.64	7.5	7.5	12.27
234	M	9.48	7.12	8.43	8.33	7.46	10.69	8.84	7.18	7.46	7.52	7.16	10.84	5.78	6.5	7.1	7.23	7.34	12.18	5.63	6.4	6.93	7.07	7.87	12.3
235	M	9.19	7.12	7.13	7.52	6.72	10.6	9.01	7.16	7.28	7.49	7.16	10.58	5.17	5.91	6.53	7.66	6.92	11.82	5.17	6.19	6.53	7.53	7.11	11.91

236	M	8.49	7.08	7.8	7.19	6.08	9.87	8.52	7.08	7.8	7.19	6.11	9.86	5.25	5.9	6.54	7.3	6.71	11.05	5.26	5.91	6.65	7.34	6.83	11.04
237	M	8.25	6.4	7.53	6.5	6.38	9.52	8.24	6.41	7.53	6.45	6.46	9.59	5.21	5.74	6.36	7.13	6.83	11.1	5.21	5.54	6.46	6.85	7.13	10.93
238	M	9.08	7.29	7.53	7.73	6.95	11.25	8.84	7.29	7.53	7.72	6.98	11.24	5.98	6.31	7.19	7.3	7.09	11.41	5.98	6.21	7.23	6.92	7.21	11.68
239	F	8.49	6.79	7.53	6.47	6.51	10.72	8.61	6.79	7.51	6.65	6.32	10.75	5.49	5.78	6.85	6.55	6.34	11.22	5.61	5.71	6.71	6.58	6.41	11.22
240	M	9.41	7.18	7.88	7.38	7.02	10.93	9.41	6.69	7.84	7.54	6.85	11.3	5.88	6.35	6.65	7.35	7.35	11.36	5.87	6.32	6.81	7.81	7.56	11.35
241	M	8.36	6.47	7.58	7.93	7.4	10.83	8.36	6.48	7.73	8.01	7.24	11.23	5.84	6.99	7.05	7.65	7.42	11.88	5.88	6.64	7.28	7.65	7.01	12.09
242	M	8.75	7.23	7.98	7.31	6.58	10.16	8.75	6.79	7.85	7.34	6.61	10.05	5.28	6.38	7.34	7.38	6.83	11.84	5.28	6.42	7.34	7.18	6.94	11.55
243	M	8.82	6.9	7.99	7.27	7.33	10.83	8.82	6.9	7.95	7.5	7.29	10.78	6.04	6.63	7.05	7.2	7.91	11.72	6.14	6.55	7.02	7.3	6.93	11.73
244	M	8.35	7.05	7.68	6.18	6	9.9	8.31	7.17	7.87	6.74	6.11	10.27	5.09	5.65	7.12	6.65	6.45	10.73	5.08	5.65	7.13	6.55	6.63	10.74
245	M	8.49	6.55	7.58	6.53	6.57	10.02	8.64	7.01	7.62	6.12	6.58	10.1	5.35	5.67	6.57	6.46	7.23	10.73	5.35	5.5	6.48	6.49	7.37	10.94
246	F	9.59	7.16	7.99	7.06	6.48	10.26		7.11	7.93	7.15	6.51	10.51	6	7.08	7.14	7.32	7.5	12.04	6.37	6.66	7.14	7.44	7.23	11.95
247	M	8.47	6.21	7.39	7.12	6.62	10.7	8.5	5.85	7.39	7.32	6.61	11.18	5.22	5.92	6.45	7.43	7.05	11.35	5.59	5.85	6.52	7.34	7.28	11.68
248	M	9.25	7.14	7.93	7.6	6.39	10.88	9.25	7.11	7.8	7.22	6.44	10.73	5.58	6.29	7.28	7.37	7.12	11.36	5.58	6.42	7.26	7.51	7	11.56
249	M	8.04	7.08	7.39	7	6.43	9.76	8.66	7.13	7.37	6.98	6.48	9.97	5.09	5.46	6.61	7.12	6.53	10.92	5.09	5.46	6.53	6.96	6.86	10.88
250	M	9.38	8.32	8.44	7.38	6.97	10.91	9.18	8.12	8.09	7.6	6.69	11.16	6.15	6.61	7.3	7.4	7.24	11.2	5.76	6.61	7.25	7.68	6.95	11.26
251	F	8.81	6.13	6.84	6.9	5.68	10.26	8.64	6.09	6.82	6.95	5.62	10.84	5.03	5.33	6.33	6.79	6.94	11.33	5.03	5.42	6.24	6.68	6.73	11.36
252	F	8.56	6.56	8.1	5.93	6.35	10.22	8.51	6.56	8.11	6.04	5.99	10.03	5.17	5.85	7.02	6.38	6.4	10.94	5.17	5.8	7.03	6.28	6.52	10.76
253	M	10.2	8.04	7.74	7.57	7.67		10.3	7.58	7.64	7.45	7.81	10.8	6.18	6.82	7.14	7.46	7.91	11.23	6.21	6.82	7.6	7.36	7.82	11.33
254	F	8.47	7.29	7.28	6.82	6.35	10.26	8.55	7.46	7.29	7.1	6.32	10.24	5.34	6.15	6.62	6.97	6.52	10.71	4.95	6.07	6.65	6.78	6.63	10.54
255	M	8.49	7.08	7.8	7.19	6.08	9.87	8.52	7.08	7.8	7.19	6.11	9.86	5.25	5.9	6.54	7.3	6.71	11.05	5.26	5.91	6.65	7.34	6.83	11.04
256	M	8.83	7.36	7.93	6.92	6.93	10.57	8.98	7.34	7.97	7.09	6.84	10.97	5.7	6.51	6.95	6.81	7.45	11.31	5.7	6.51	6.81	7.04	7.1	11.39
257	F	8.61	7.18	7.98	6.84	6.34	9.34	8.62	7.16	7.94	6.84	6.26	9.33	5.21	6.02	7.12	6.95	6.74	10.51	5.27	6.02	6.97	6.86	6.85	9.59
258	M	8.49	7.08	7.8	7.19	6.08	9.87	8.52	7.08	7.8	7.19	6.11	9.86	5.25	5.9	6.54	7.3	6.71	11.05	5.26	5.91	6.65	7.34	6.83	11.04
259	F	8.58	6.71	7.52	6.84	6.04	10.47	8.41	6.88	7.47	6.89	6.04	10.64	5.41	5.72	6.65	6.88	7.02	10.6	5.41	5.77	6.69	7.02	6.62	10.31
260	F	8.83	6.27	7.36	6.54	6.63	10.15	8.82	6.57	7.37	6.48	6.62	10.08	5.4	5.76	6.47	6.86	6.71	10.71	5.5	5.96	6.47	6.77	6.73	11.15
261	M	7.91	6.48	7.77	6.66	6.36	10.1	8.12	6.48	7.77	6.86	6.21	10.14	5.06	5.76	6.67	6.92	6.72	10.76	5.03	5.76	6.67	6.9	6.68	11.04
262	M	9.27	7.43	7.68	7.33	7.28	10.41	9	7.43	7.68	7.25	7.28	10.55	5.8	6.39	6.93	7.11	7.13	11.23	5.78	6.41	6.94	7.27	7.34	11.29
263	M	8.59	6.57	7.76	7.28	6.4	10.73	8.59	6.57	7.7	7.18	6.51	10.93	5.58	6.24	6.97	7.37	7.23	11	5.58	6.06	6.97	7.32	7.33	11.21
264	M	8.61	7.03	7.4	7.08	5.95	10.3	8.68	7.38	7.42	7.14	5.91	10.33	5.1	5.66	6.54	6.97	7.16	11.37	5.06	5.66	6.53	6.95	7.41	11.38
265	M	8.49	7.08	7.8	7.19	6.08	9.87	8.52	7.08	7.8	7.19	6.11	9.86	5.25	5.9	6.54	7.3	6.71	11.05	5.26	5.91	6.65	7.34	6.83	11.04
266	M	8.1	6.75	7.79	6.7	6.1	10.34	8.1	7.14	7.66	6.63	6.35	10.81	4.92	5.69	7.3	6.86	6.29	10.59	5.09	5.69	7.3	7.13	6.44	10.73
267	F	8.78	7.52	7.24	6.85	6.71	11.03	9.13	6.9	7.2	6.79	6.86	10.98	5.64	6.49	6.34	6.86	7.27	11.72	5.71	6.49	6.26	6.9	7.41	11.79
268	M	8.63	6.16	7.95	7.31	6.34	10.46	8.63	6.83	7.95	7.11	6.5	10.76	5.42	6.25	6.96	7.05	6.97	11.3	5.42	6.33	6.86	7.22	7.2	11.24
269	F	8.61	7.18	7.98	6.84	6.34	9.34	8.62	7.16	7.94	6.84	6.26	9.33	5.21	6.02	7.12	6.95	6.74	10.51	5.27	6.02	6.97	6.86	6.85	9.59
270	M	9.26	7.36	8.21	7.32	7.06	10.26	9.42	7.21	8.3	7.36	6.64	10.47	5.64	6.56	7.23	7.36	7.08	10.53	5.82	6.57	7.03	7.48	7.21	10.57
271	M	7.73	6.16	7.35	6.79	6.11	10.25	7.83	5.95	7.29	6.74	6.29	9.98	4.76	5.37	6.39	6.71	6.64	9.84	4.79	5.37	6.41	6.78	6.82	10.49
272	F	9.31	8.14	7.7	6.98	6.46	10.88	9.32	7.52	7.95	7.65	5.3	11.4	5.94	6.43	7.81	6.96	7.18	11.29	5.95	6.74	7.84	7.22	7.74	11.15
273	F	8.79	6.76	7.12	6.89	6.52	10.51	8.79	6.68	6.92	7.14	6.42	10.04	5.64	5.9	6.86	6.88	6.85	11.3	5.6	5.9	6.86	6.87	6.86	11.53
274	M	8.49	7.08	7.8	7.19	6.08	9.87	8.52	7.08	7.8	7.19	6.11	9.86	5.25	5.9	6.54	7.3	6.71	11.05	5.26	5.91	6.65	7.34	6.83	11.04
275	M	8.48	7.03	8.14	6.75	6.57	10.22	8.48	7.05	8.14	6.89	6.34	10.56	5.43	6.1	6.87	6.95	7.1	10.76	5.43	6.12	6.8	7.03	7.24	11.02
276	F	8.98	6.54	7.48	6.89	6.42	9.8	8.47	6.56	7.67	6.82	6.31	9.41	5.45	6.76	6.46	7.4	7.56	11.03	5.45	6.5	6.66	7.63	7.54	10.54
277	F	8.61	7.18	7.98	6.84	6.34	9.34	8.62	7.16	7.94	6.84	6.26	9.33	5.21	6.02	7.12	6.95	6.74	10.51	5.27	6.02	6.97	6.86	6.85	9.59
278	F	8.98	6.54	7.48	7.09	6.62	9.8	8.47	6.56	7.67	6.82	6.31	9.41	5.65	6.91	6.46	7.4	7.66	11.03	5.65	6.65	6.66	7.63	7.64	10.54
279	M	8.14	6.3	7.69	6.88	6.88	10.21	8.09	6.44	7.69	6.98	6.74	10.41	5.16	5.86	6.81	7.27	7.28	11.23	5.08	5.86	6.78	7.55	6.93	11.37
280	F	8.45	7.22	8.09	6.81	7.13	11.05	8.45	7.31	8.25	6.61	6.02	10.72	5.44	5.89	7.21	6.26	7.13	11.44	5.42	6.01	7.21	6.71	6.98	11.04
281	M	8.49	7.08	7.8	7.19	6.08	9.87	8.52	7.08	7.8	7.19	6.11	9.86	5.25	5.9	6.34	7.1	6.71	11.05	5.26	5.91	6.65	7.34	6.83	11.04
282	M	8.73	7.71	8.23	7.9	7.28	11.41	8.71	7.24	8.63	7.92	7.24	11.46	5.7	6.26	7.34	8.07	7.7	12.46	5.76	6.29	7.46	8.1	7.83	12.43
283	M	8.77	6.76	7.83	7.05	6.56	10.38	8.77	6.79	7.83	7.15	6.44	10.89	5.85	6.26	7.73	8.14	8.19	11.84	5.56	6.26	7.73	8.4	8.08	12.08
284	M	7.79	6.48	7	6.76	6.32	10.01	7.62	6.48	7.19	6.92	6.3	9.81	4.9	5.37	6.2	6.86	6.73	10.96	4.92	5.37	6.2	6.92	7.22	10.8

285	F	8.84	7.36	7.69	6.45	6.31	10.25	8.92	7.16	7.72	6.82	6.32	9.82	5.42	6.29	6.83	7.26	7	10.58	5.42	6.6	6.76	6.91	7.17	10.67
286	M	8.68	6.89	8.05	7.43	6.84	10.01	8.6	6.91	7.84	7.38	6.78	10.24	5.24	5.69	7.11	7.38	7.3	11.16	5.26	5.68	6.8	7.39	6.62	11.48
287	M	8.49	7.08	7.8	7.19	6.08	9.87	8.52	7.08	7.8	7.19	6.11	9.86	5.25	5.9	6.54	7.3	6.71	11.05	5.26	5.91	6.65	7.34	6.83	11.04
288	F	8.23	5.64	7.48	6.69	6.34	9.86	8.25	5.38	7.38	6.46	6.24	9.76	5.01	5.69	6.28	6.55	6.43	10.47	5	5.74	6.46	6.65	6.66	10.85
289	M	8.5	6.9	7.31	6.9	5.81	10.16	8.5	6.93	7.33	6.78	6.02	10.03	4.91	5.35	6.35	6.69	6.15	10.37	4.91	5.46	6.46	6.49	6.43	10.47
290	M	7.84	6.04	7.87	6.56	6.55	10.24	7.78	6.15	7.84	7.07	6.96	10.28	4.81	5.71	6.91	7.52	6.72	10.95	5.04	5.73	6.89	7.45	7.04	10.91
291	M	8.37	6.73	7.86	7.28	6.26	10.93	8.37	6.76	7.86	7.25	6.5	10.58	6.02	6.07	7.08	7.14	6.62	11.22	5.48	6.07	7.11	7.16	6.97	11.55
292	F	8.51	6.66	7.57	6.29	6.24	9.46	8.39	6.82	7.72	6.32	6.01	10.07	5.47	5.57	6.45	6.54	6.78	10.24	5.46	5.54	6.46	6.57	6.71	10.27
293	M		6.33	7.61	7.02	6.48	9.88	8.84	6.44	7.73	7.08	6.46	10.24	5.49	5.82	6.81	7.18	6.92	11.27	5.45	5.81	6.8	7.23	6.97	11.45
294	M	8.3	6.52	8.12	7.25	6.51	10.06	8.37	5.98	8.14	7.26	6.92		5.62	6.29	6.81	6.72	6.55	10.28	5.63	6.29	6.92	6.92	6.64	10.28
295	M	8.81	6.97	7.98	7.23	6.99	10.4	8.8	6.92	7.98	6.98	7	10.51	5.74	6.17	6.98	7.35	7.19	11.29	5.74	6.15	7.07	7.42	7.46	11.67
296	M	8.76	7.03	8.04	7.04	6.56	9.97	8.77	7.14	8.04	6.92	6.86	9.96	5.45	6.27	7.2	7.21	7.1	11.06	5.45	6.24	6.93	7.3	6.97	11.26
297	M	9.15	7.06	7.39	6.74	6.43	10.47	8.91	6.78	7.47	7.07	6.74	9.8	5.53	5.92	7.03	7.02	7.26	10.89	5.58	5.99	6.96	7.02	7.8	10.93
298	F	8.13	6.5	7.15	7.11	5.87	9.38	8.17	6.34	7.14	7.1	5.84	9.36	5.09	5.64	6.27	6.85	6.62	10.32	5.07	5.63	6.24	6.87	6.65	10.28
299	F	8.78	6.53	7.6	6.64	6.28	10.43	8.76	6.61	7.58	7.21	5.84	10.18	5.5	6.09	7.03	7.18	6.44	11.01	5.56	6.12	7.14	7.18	6.34	11.04
300	M	8.46	6.55	7.25	6.78	6.34	10.53	8.44	6.61	7.2	6.71	6.37	10.68	5.25	5.29	6.23	7.15	6.78	11.43	5.25	5.29	6.42	6.87	6.56	11.22
301	M	8.84	7.59	7.96	6.79	6.32	9.79	8.71	7.59	7.91	6.95	6.47	10.15	5.5	6.04	7.16	6.94	6.86	10.23	5.56	6.04	7.07	6.96	6.86	10.29
302	M	9.2	7.02	8.12	7.31	7.01	10.9	9.18	7.12	8.19	7.32	6.97	10.96	5.83	6.54	7.45	7.3	7.31	11.29	6.14	6.42	7.48	7.46	7.51	11.71
303	F	8.83	6.53	8.09	5.92	6.27	10.36	8.73	6.54	8.1	6.12	5.9	10.18	5.25	6.02	7.06	6.53	6.39	10.68	5.28	6.01	7.05	6.11	6.89	10.78
304	M	8.84	7.26	8.14	7.11	6.56	10.12	8.82	7.54	8.16	7.08	6.57	9.82	5.74	6.28	7.33	7.12	6.95	11.69	5.69	6.41	7.13	7.18	7.03	11.79
305	M	7.88	7.52	8.13	7.02	7.28	10.03	7.81	7.69	8.12	6.83	7.14	9.76	5.12	5.67	7.1	7.79	7.42	10.46	5.12	5.65	6.94	7.38	7.24	10.61
306	F	9.81	8.13	7.83	7.68	7.03	11.62	9.89	8.17	8.22	7.63	6.82	11.67	5.85	7.03	6.98	7.9	7.47	12.72	5.84	7.03	7.04	7.99	7.42	12.69
307	F	9.72	7.76	8.69	7.27	6.16	10.6	9.76	7.62	8.7	7.35	6.17	10.67	5.61	6.6	7.31	7.45	6.82	11.71	5.6	6.6	7.33	7.45	6.98	11.7
308	M	8.33	6.39	8.43	7.54	6.71	9.75	8.34	6.39	8.04	7.43	6.11	10.03	5.67	6.05	6.82	7.13	7.22	11.77	5.78	6.02	6.99	7.25	7.02	11.77
309	M	8.35	7.09	8.08	6.79	6.46	9.78	8.33	7.01	8.08	6.76	6.48	9.79	5.45	6.09	6.94	7.01	7.19	10.04	5.55	6.07	6.8	6.96	6.98	9.95
310	M	7.86	7.11	7.28	6.61	6.38	9.18	7.86	6.27	7.39	6.83	6.06	9.02	4.96	5.48	6.78	6.76	6.77	10.25	4.95	5.51	6.68	6.8	6.85	10.54
311	F	7.86	6.81	7.33	6.89	6.79	11.17	8.04	6.59	7.46	6.87	6.62	10.47	5.37	6.19	6.68	7.09	7.08	12.26	5.37	6.09	6.77	7.15	7.06	12.06
312	F	9.43	7.42	8.27	7.16	7.27	10.18	9.29	7.41	8.38	7.72	6.61	10.09	6.21	6.47	7.19	7.44	7.51	10.72	6.27	6.62	7.39	7.58	7.14	11
313	M	8.82	6.52	8.2	7.09	6.69	10.21	8.83	6.47	8.25	7.04	6.64	10.27	6.04	6.03	6.97	7.18	7.47	11.79	5.88	6.03	7.07	7.08	7.42	12.05
314	M		7.67	8.04	7.28	6.27	9.99	8.65	7.3	8.06	7.35	6.31	10.03	5.29	3.18	7.29	7.48	6.52	10.99	5.28	6.78	7.26	7.2	6.99	10.76
315	M	8.76	7.12	9.02	6.83	6.35	10.32	8.77	7.34	8.68	7.28	6.33	10.12	5.88	6.84	7.52	7.28	7.28	11.46	5.9	6.42	7.36	7.41	7.35	11.35
316	F	8.61	7.02	7.82	6.61	6.09	9.68	8.6	7.03	7.85	6.57	6.09	9.32	5.42	6.02	6.84	6.74	6.81	10.36	5.41	6.05	6.85	6.72	6.81	9.98
317	F	8.06	6.07	6.89	6.11	5.79	8.88	7.95	6.04	6.84	6.14	5.88	9.1	4.82	5.32	6.34	6.36	6.11	10.01	4.82	5.08	6.34	6.28	6.14	10.12
318	M	8.64	7.36	7.82	7.28	6.23	10.31	8.65	6.84	7.78	7.1	6.56	10.08	5.39	6.18	6.72	6.94	7.45	11.25	5.38	6.02	6.77	7.02	7.01	11.6
319	M	8.28	6.14	7.78	6.78	6.71	9.66	8.17	6.13	7.71	6.57	6.66	9.75	5.3	5.79	6.8	6.98	6.63	11.31	5.3	5.71	6.71	6.98	6.73	11.23
320	M	9.12	6.79	8.18	7.05	6.95	11.14	9.11	6.58	8.18	7.08	6.93	10.41	5.87	6.63	7.5	7.1	7.11	11.71	5.87	6.63	7.7	7.64	7.35	11.61
321	M	8.14	6.56	7.55	7.2	6.67	10.1	8.01	6.09	7.52	7.16	6.55	10.41	5.21	5.84	6.5	7.21	7.39	11.67	5.23	5.15	6.49	7.16	7.31	11.6
322	M	8.53	6.94	7.67	6.69	6.38	10.04	8.14	6.95	7.67	6.67	6.43	10.16	5.72	6.02	6.81	7.18	7.05	11.35	5.76	6.01	6.78	7.09	7.1	11.41
323	F	8.32	6.89	7.63	6.4	6.26	9.35	8.41	7.15	7.64	6.46	6.24	9.2	5.26	5.04	6.35	6.93	6.96	10.5	5.05	5.4	6.35	6.92	6.97	10.45
324	M	8.49	7.08	7.8	7.19	6.08	9.87	8.52	7.08	7.8	7.19	6.11	9.86	5.25	5.9	6.54	7.2	6.81	11.05	5.26	5.91	6.65	7.34	6.83	11.04
325	M	9.23	7.78	8.29	7.25	6.42	9.9	9.22	7.51	8.25	7.3	6.56	10.01	6.05	6.07	7.51	7.07	7.09	11.88	6.05	6.31	7.32	7.25	7.12	11.76
326	M	8.73	7.61	8.28	6.82	6.57	10.27	8.69	7.35	8.09	6.85	6.73	10.01	5.25	6.41	6.47	7.69	7.05	11.5	5.23	6.65	6.6	7.4	7.31	11.43
327	F	7.41	6.35	7.03	6.2	6.36	8.89	7.37	6.36	6.95	6.26	6.28	8.95	4.54	5.18	6.33	6.43	6.61	10.49	4.55	5.18	6.22	6.42	6.71	10.45
328	M	8.63	7.2	7.94	7.31	6.1	10.71	8.38	6.9	7.92	7.42	6.14	10.69	5.4	6.01	6.78	6.91	7.12	11.68	5.4	6.01	6.82	7.27	7.21	11.76
329	M	9.21	7.14	7.98	7.05	6.96	10.09	9.03	6.85	8.12	7.04	6.71	10.05	5.38	6.43	7.14	7.25	6.96	11.55	5.64	6.43	7.04	7.33	7.13	11.86
330	M	7.78	6.57	7.41	6.54	6.29	9.7	7.83	6.58	7.44	6.59	6.19	9.76	4.71	5.66	6.47	6.56	6.9	10.55	5.02	5.67	6.46	6.59	6.87	10.52
331	F	8.82	6.08	7.59	6.81	6.72	9.45	8.81	6.26	7.64	6.98	6.63	9.41	5.36	5.85	6.27	7.41	7.31	11.32	5.36	5.86	6.38	7.42	7.36	11.32
332	M	8.82	7.94	8.52	6.98	7.16	10.65	9	7.99	8.54	7.49	6.94	11	6.01	6.92	7.43	7.2	7.63	10.6	6.06	6.92	7.4	7.31	7.66	11.07
333	M	9.06	7.67	8.06	7.32	6.73	10.64	8.97	7.48	8.06	7.31	6.83	10.64	5.59	6.63	7.36	7.07	7.21	11.35	5.58	6.63	7.37	7.18	7.03	11.38

334	M	8.68	7.27	8.02	7.14	6.76	11.3	8.71	7.25	8.06	7.16	6.73	11.17	5.78	6.3	7.26	7.25	7.02	11.69	5.71	6.3	7.17	7.49	6.79	11.79
335	M	9.23	7.34	9.12	7.91	7.39	11.03	9.63	6.99	9.12	8.1	7.6	11.03	6.09	6.68	7.75	7.98	7.3	12.07	6.09	6.68	7.92	8.14	7.95	12.07
336	M	8.99	6.88	8.42	6.78	6.37	10.62	8.99	6.88	8.33	6.72	6.31	10.75	5.61	5.8	6.96	7.1	6.84	11.58	5.6	5.78	6.97	7.05	6.54	11.56
337	M	8.85	7.22	8.11	7.06	6.81	10.85	8.65	7.06	8.12	6.93	6.97	10.85	5.51	6.44	7.23	7.15	7.04	11.55	5.51	6.34	7.24	7.14	7.07	12.06
338	M	9.56	7.05	8.11	7.35	6.59	10.14	9.66	7.05	8.12	7.13	6.65	10.45	5.65	6.38	7.18	7.34	7.01	10.42	5.65	6.15	7.16	7.34	6.97	11.27
339	F	8.3	6.87	7.68	7	6.87	10.7	8.26	6.89	7.72	6.86	6.83	10.7	5.36	6.01	6.83	7.1	6.93	11.32	5.32	6.01	6.88	7.23	6.77	11.45
340	M	8.94	6.86	7.63	7.26	7.04	9.76	9.03	7.12	7.63	7.25	7.1	9.94	5.75	6.21	7.06	6.84	7.56	10.87	5.8	6.2	7.07	7.01	7.51	10.44
341	M	9.02	6.87	7.37	6.63	6.29	10.41	9.02	7.33	7.49	6.6	6.34	10.45	5.18	5.48	6.62	6.91	6.62	10.91	5.2	5.61	6.56	6.83	6.52	10.99
342	M	8.19	7.27	7.9	6.85	6.68	10.28	8.79	6.83	7.7	6.91	6.47	10.87	5.2	6.04	7.17	7.14	7.23	11.7	5.33	5.83	6.85	7.08	6.92	11.38
343	F	7.74	6.86	7.63	6.78	6.19	10.41	7.86	6.92	7.79	6.71	6.24	10.61	5.26	5.91	7.1	6.61	6.59	11.21	5.24	5.97	7.11	6.6	6.67	11.17
344	M	8.63	6.67	8.02	7.07	6.57	9.78	8.71	7.23	7.93	7.3	6.59	9.53	5.28	5.97	6.94	6.86	7.06	11.53	5.31	5.98	6.85	7.05	7.08	11.45
345	M	9.11	6.91	7.93	6.4	6.92	9.57	8.75	6.81	7.99	6.4	6.67	9.92	5.22	6.01	6.84	6.97	6.97	10.82	5.22	6.19	6.85	6.7	6.99	10.87
346	F	7.47	5.71	6.6	6.75	6.31	9.91	7.5	5.66	6.45	6.94	6.29	9.9	4.85	5.45	6.15	6.64	6.19	11.1	4.86	5.35	6.05	6.45	6.79	11.19
347	M	8.12	7.36	7.99	7.19	6.99	10.62	8.27	7.36	8.13	7.19	7.12	11.31	5.91	6.24	7.09	7.63	7.51	11.66	5.91	6.34	7.02	7.68	7.53	11.77
348	M	8.29	7.01	7.29	7.26	6.86	10.62	8.27	7.01	7.26	7.33	6.88	10.84	5.59	5.89	6.41	7.04	6.97	11.3	5.59	5.79	6.38	7.25	7.06	11.95
349	M	8.66	7.33	7.25	6.49	6.52	10.13	8.58	7.33	7.31	6.62	6.62	10.11	5.34	6	6.58	6.71	7.21	11.25	5.44	6.05	6.58	6.73	6.83	11.4
350	F	8.68	6.98	7.86	7.43	5.88	10.53	8.68	6.88	8.05	7.14	6.09	11.11	5.48	6.18	7.26	7.28	7.17	11.23	5.58	6.15	7.24	7.03	6.83	11.4
351	M	9.19	7.08	7.71	6.89	6.59		9.16	7.09	7.73	7.19	6.24	10.88	5.26	5.93	6.8	6.96	6.88	10.46	5.26	5.88	6.78	6.97	6.87	10.28
352	M	8.06	6.51	7.27	6.83	6.46	10.37	8.07	6.48	7.46	6.97	6.79	9.96	5.05	5.73	6.62	6.97	6.67	10.81	5.05	5.76	6.62	6.86	6.19	10.9
353	M	7.84	6.41	7.02	6.23	5.78	8.78	7.93	6.47	7.27	6.46	5.86	8.72	4.43	5.28	5.84	6.47	6.04	10.31	4.43	5.28	6.15	6.76	6.19	10.59
354	F	7.8	7.05	7.55	6.61	6.23	9.87	7.68	7.01	7.53	6.69	6.11	10.06	5.06	5.66	6.51	6.81	6.72	10.89	5.06	5.58	6.52	6.88	6.81	10.63
355	M	8.67	6.74	6.99	6.95	6.88	10.23	8.67	6.76	7.04	6.95	6.89	10.13	5.28	5.6	6.38	7.03	6.98	10.19	5.32	5.68	6.28	6.92	6.82	10.15
356	M	8.45	6.81	7.34	6.83	6.4	10.33	8.45	6.99	7.3	6.8	6.81	10.44	5.21	5.72	6.23	6.89	7.23	10.68	5.33	5.72	6.23	6.92	7.31	10.63
357	M	8.21	7.08	7.32	7.26	6.5	10.24	8.45	7.24	7.26	7.05	6.41	9.7	5.52	6.01	6.49	6.98	6.91	10.06	5.58	6.32	6.45	6.85	7.02	10.37
358	F	7.86	6.7	7.43	6.89	6.13	9.3	8.49	6.7	7.82	6.79	5.84	9.29	5.67	5.88	6.71	6.76	6.45	10.66	5.69	5.89	6.61	6.87	6.6	10.46
359	M	9.33	6.91	7.26	6.56	6.78	10.78	8.29	6.98	7.64	6.71	6.7	10.79	5.5	6.15	6.48	7.01	7.03	10.71	5.56	6.29	6.24	6.93	7.21	10.69
360	M	8.33	7.07	7.88	7.13	7.07	9.83	8.34	7.13	7.99	7.07	6.95	10.36	5.52	6.37	6.83	7.1	7.32	11.29	5.49	6.49	6.85	7.13	7.37	11.31
361	M	8.51	6.72	7.5	7.02	6.58	9.87	8.39	6.74	7.51	6.9	6.64	9.97	5.27	5.95	6.44	7.26	6.83	10.17	5.27	5.96	6.44	7.3	7.14	10.01
362	F	8.05	6.09	7.18	6.64	6.46	9.81	8.13	6.02	7.19	6.6	6.45	9.95	5.44	5.58	6.24	6.97	6.67	11.78	5.44	5.52	6.29	7.02	6.58	11.71
363	F	9.32	7.48	8.31	7.12	7.02	10.77	9.34	7.65	8.2	7.1	7.02	10.38	5.65	6.67	7.56	7.31	7.3	11.66	5.65	6.74	7.56	7.64	7.05	11.67
364	M	8.47	7.58	7.71	6.85	6.43	10.94	8.47	6.94	7.74	6.82	6.37	10.35	5.11	5.85	6.51	7.03	6.94	10.41	5.03	5.87	6.51	6.96	6.92	10.28
365	M	9.15	7.97	7.83	7	6.55	11.16	9.14	7.76	7.83	7.04	6.64	11.39	5.12	6.01	6.98	7.41	6.34	11.7	5.22	6.01	6.95	7.45	6.34	11.41
366	M	8.8	7.03	7.81	6.52	5.43	10.13	8.24	7.06	7.72	6.42	5.72	10.08	5.07	5.61	6.8	6.5	6.64	10.31	5.07	5.63	6.86	6.49	6.7	
367	M	10.24	7.62	8.38	6.52	6.38	11.31	9.33	8.06	8.23	6.58	6.23	11.01	5.24	5.87	6.72	7.1	6.51	11.21	5.24	6.02	6.74	7.05	6.53	11.07
368	F	8.63	7.41	7.64	6.96	6.39	10.32	8.63	7.4	7.64	6.98	6.44	10.51	5.43	6.21	6.82	7.08	6.9	11.04	5.4	6.04	6.82	7.11	6.95	10.93
369	F	8.5	6.59	7.56	6.48	6.6	9.98	8.83	7.11	7.5	6.47	6.51	10.47	5.15	5.58	6.69	6.46	7.17	10.72	5.15	5.43	6.48	6.52	7.27	10.86
370	M	8.89	7.06	8.02	7.13	6.54	10.69	9.06	7.06	7.99	7.12	6.89	10.41	5.64	6.26	7.08	7.06	7.23	11.49	5.38	6.31	7.09	7.24	7.48	11.58
371	M	8.83	7.41	7.68	7.21	7.07	10.32	8.83	7.31	7.71	7.74	6.58	10.22	5.58	6.43	6.65	6.98	7.01	11.16	5.58	6.28	6.75	7.13	7.41	11.23
372	F	8.45	6.8	6.95	7.32	6.29	11.63	8.45	6.8	7.59	7.01	6.2	10.68	5.26	5.62	6.72	6.87	6.86	10.36	5.26	5.85	6.69	6.88	7.09	10.72
373	M	8.61	6.99	7.84	7.16	6.43		8.52	7.07	8.01	7.17	6.26	10.94	5.5	5.94	6.57	6.81	7.11	10.03	5.3	5.97	6.62	6.89	7.25	102
374	F	8.52	6.09	7.57	7.02	6.74	9.75	8.52	6.35	7.57	7.04	6.58	10.09	5.11	6.21	6.62	6.82	7.2	10.59	4.94	6.18	6.58	6.57	7.03	10.42
375	M	9.82	8.16	8.08	7.23	7.21	10.92	9.78	8.26	7.97	7.19	7.28	11.54	5.98	6.52	7.4	7.33	7.32	12.07	5.97	6.59	7.4	7.35	7.27	11.98
376	M	9.38	7.23	8.67	8.44	8.07	10.99	9.73	7.71	8.57	7.64	7.73	11.41	4.74	5.63	6.78	7.51	6.3	11.47	5.01	5.63	6.73	7.37	6.44	11.34
377	M	8.09	6.51	7.79	6.78	6.01	9.55	8.43	7	7.73	6.68	5.89	9.63	5.55	6.09	6.58	7.09	6.94	10.22	5.55	6.1	6.58	7.11	7.17	10.47
378	F	8.27	6.68	7.68	7.08	8.88	10.48	8.3	6.68	7.85	7.17	7.58	10.7	5.75	6.15	6.95	6.97	7.51	12.01	5.83	6.05	6.95	7.11	7.41	11.7
379	M	8.01	6.29	6.93	6.65	6.23	9.37	7.88	6.29	6.91	6.56	6.24	9.78	5.43	5.64	6.03	6.69	6.61	10.21	5.4	5.65	6.16	6.39	6.77	10.34
380	M	8.56	7.17	7.85	7.18	5.87	10.35	8.55	7.18	7.6	7.31	6.12	10.24	5.45	5.78	6.23	7.25	6.7	11.12	5.4	5.83	6.39	7.19	6.74	11.09
381	M	8.17	6.54	7.93	7.31	6.88	10.28	8.1	6.92	8.23	7.23	7.23	10.52	5.35	5.65	7.18	6.92	6.83	10.97	5.6	5.92	7.13	6.96	6.85	11.5
382	M	8.84	7.36	7.69	6.45	6.31	10.25	8.92	7.16	7.72	6.82	6.32	9.82	5.42	6.29	6.83	7.26	7	10.58	5.42	6.6	6.76	6.91	7.17	10.67

383	F	8.68	6.89	8.05	7.43	6.84	10.01	8.6	6.91	7.84	7.38	6.78	10.24	5.24	5.69	7.11	7.38	7.3	11.16	5.26	5.68	6.8	7.39	6.62	11.48
384	F	9.52	7.59	8.12	7.63	7.27	10.65	9.52	7.59	8.12	7.65	7.18	10.64	6.16	6.72	7.45	8.09	7.24	12.1	6.16	6.72	7.64	7.5	7.5	12.27
385	F	8.23	5.64	7.48	6.69	6.34	9.86	8.25	5.38	7.38	6.46	6.24	9.76	5.01	5.69	6.28	6.55	6.43	10.47	5	5.74	6.46	6.65	6.66	10.85
386	M	8.5	6.9	7.31	6.9	5.81	10.16	8.5	6.93	7.33	6.78	6.02	10.03	4.91	5.35	6.35	6.69	6.15	10.37	4.91	5.46	6.46	6.49	6.43	10.47
387	M	7.84	6.04	7.87	6.56	6.55	10.24	7.78	6.15	7.84	7.07	6.96	10.28	4.81	5.71	6.91	7.52	6.72	10.95	5.04	5.73	6.89	7.45	7.04	10.91
388	M	8.37	6.73	7.86	7.28	6.26	10.93	8.37	6.76	7.86	7.25	6.5	10.58	6.02	6.07	7.08	7.14	6.62	11.22	5.48	6.07	7.11	7.16	6.97	11.55
389	F	8.5	7.42	7.13	7.1	6.43	10.1	8.67	7.26	7.19	7.12	6.33	10.31	5.38	6	6.7	7.01	6.59	10.72	5.38	6.1	6.67	6.94	6.67	10.5
390	M	9.18	7.34	8	7.13	7.24	10.86	9.19	6.91	8.05	7.1	7.21	11.09	4.84	5.45	6.59	6.58	6.58	10.91	4.84	5.45	6.54	6.63	6.55	11.03
391	M	8.88	6.48	7.95	7.01	6.66	10.78	8.78	6.43	8.01	7.09	6.62	11.11	5.59	6.04	6.7	7.25	7.22	11.69	5.54	6.06	6.75	7.02	7.14	11.66
392	M	9.75	7.77	7.97	7.38	7.09	11.23	9.75	7.77	7.76	7.52	7.16		5.94	6.44	7.34	7.56	7.07	12.06	6.18	6.54	7.36	7.61	7.01	12.1
393	F	8.58	6.76	7.8	6.67	6.61	10.7	8.55	6.76	7.89	6.9	6.38	10.84	5.41	5.84	6.72	6.61	6.48	11.23	5.71	5.93	6.79	6.71	6.49	11.2
394	M	8.04	6.45	7.69	7.14	6.98	9.46	7.96	6.47	7.65	7.13	7.02	9.24	5.52	6.22	6.81	7.39	7.14	10.58	5.52	6.22	6.91	7.29	6.87	10.78
395	M	8.91	6.77	7.78	7.11	7.07	11.07	8.91	6.76	7.77	7.22	7.09	10.92	5.66	6.31	6.98	7.31	7.65	11.88	5.66	6.21	7.01	7.29	7.15	11.8
396	M	9.6	7.15	8.12	7.22	6.69	10.42	9.6	7.15	7.98	7.15	6.43	11.07	5.95	6.65	7.03	7.25	7.44	12.1	5.93	6.59	7.08	7.53	7.29	12.02
397	M	9.05	6.52	7.95	7.05	6.74	10.86	9.05	6.53	7.88	7.05	6.71	11.1	5.67	6.05	6.73	7.26	7.16	11.73	5.67	6.06	6.79	7.07	7.14	11.62
398	F	7.86	6.4	7.02	6.53	6.29	8.83	7.9	6.41	7.04	6.55	6.27	9.11	5.09	5.7	6.7	6.4	6.68	10.09	5.1	5.7	6.8	6.36	6.46	
399	M	8.6	7.14	7.66	6.54	6.03	9.84	8.23	7.14	7.67	6.71	5.98	10.16	4.68	5.54	7.08	6.49	6.61	10.63	5.14	5.54	7.09	6.47	6.32	10.78
400	F	7.91	6.39	7.25	6.67	6.47	10.31	7.94	6.56	7.24	6.65	6.45	10.17	5.09	5.38	6.3	6.34	6.3	11.01	5.12	5.56	6.51	6.58	6.59	11.01
401	F	7.91	6.64	7.12	6.8	6.36	10.03	8.07	7.01	7.13	6.78	6.71	9.69	5.87	5.97	6.69	7.13	7.01	11.5	4.95	5.96	6.58	7.06	6.67	11.36
402	M	8.32	6.89	7.63	6.4	6.26	9.35	8.41	7.15	7.64	6.46	6.24	9.2	5.26	5.04	6.35	6.93	6.96	10.5	5.05	5.4	6.35	6.92	6.97	10.45
403	M	9.03	6.86	7.49	6.39	6.13	9.96	8.99	6.73	7.22	6.54	6.35	9.51	5.43	5.31	6.45	6.5	6.74	10.07	5.43	5.37	6.35	6.5	6.8	11.21
404	M	8.49	7.08	7.8	7.19	6.08	9.87	8.52	7.08	7.8	7.19	6.11	9.86	5.25	5.9	6.54	7.2	6.81	11.05	5.26	5.91	6.65	7.34	6.83	11.04
405	M	9.23	7.78	8.29	7.25	6.42	9.9	9.22	7.51	8.25	7.3	6.56	10.01	6.05	6.07	7.51	7.07	7.09	11.88	6.05	6.31	7.32	7.25	7.12	11.76
406	M	8.73	7.61	8.28	6.82	6.57	10.27	8.69	7.35	8.09	6.85	6.73	10.01	5.25	6.41	6.47	7.69	7.05	11.5	5.23	6.65	6.6	7.4	7.31	11.43
407	F	7.41	6.35	7.03	6.2	6.36	8.89	7.37	6.36	6.95	6.26	6.28	8.95	4.54	5.18	6.33	6.43	6.61	10.49	4.55	5.18	6.22	6.42	6.71	10.45
408	F	8.63	7.2	7.94	7.31	6.1	10.71	8.38	6.9	7.92	7.42	6.14	10.69	5.4	6.01	6.78	6.91	7.12	11.68	5.4	6.01	6.82	7.27	7.21	11.76
409	M	9.21	7.14	7.98	7.05	6.96	10.09	9.03	6.85	8.12	7.04	6.71	10.05	5.38	6.43	7.14	7.25	6.96	11.55	5.64	6.43	7.04	7.33	7.13	11.86
410	M	8.41	7.18	7.9	7.07	6.32	9.86	8.42	6.83	7.81	7.12	6.32	9.82	5.31	6.03	6.56	7.3	6.81	10.29	5.31	6.01	6.46	7.29	6.72	10.2
411	F	7.78	6.57	7.41	6.54	6.29	9.7	7.83	6.58	7.44	6.59	6.19	9.76	4.71	5.66	6.47	6.56	6.9	10.55	5.02	5.67	6.46	6.59	6.87	10.52
412	F	8.82	6.08	7.59	6.81	6.72	9.45	8.81	6.26	7.64	6.98	6.63	9.41	5.36	5.85	6.27	7.41	7.31	11.32	5.36	5.86	6.38	7.42	7.36	11.32
413	F	8.82	7.94	8.52	6.98	7.16	10.65	9	7.99	8.54	7.49	6.94	11	6.01	6.92	7.43	7.2	7.63	10.6	6.06	6.92	7.4	7.31	7.66	11.07
414	M	9.11	7.58	7.79	7.03	7.22	10.67	9.11	7.16	7.77	7.02	7.06	10.94	5.78	6.18	6.7	7.2	7.71	11.78	5.78	6.18	6.7	7.14	7.69	11.8
415	M	9.07	7.99	8.26	6.98	6.38	11.47	9.17	7.97	8.19	6.94	6.36	10.8	5.36	6.47	6.97	6.93	7.66	11.96	5.56	6.72	6.87	6.93	7.65	11.73
416	F	8.61	6.96	7.71	7.08	7.19	10.51	8.63	7.04	7.74	7.21	6.91	10.39	5.58	6.38	6.84	7.39	7.26	11.34	5.58	6.37	6.98	7.38	7.12	11.21
417	M	9.15	7.61	8.09	7.06	7.04	10.38	9.17	7.62	8.06	7.06	6.79	10.72	5.9	6.3	7.45	7.08	7.19	11.07	5.92	6.3	7.42	7.19	7.49	11.55
418	M	9.23	6.96	7.74	6.58	6.32	10.9	9.25	6.86	7.94	6.98	5.68	10.9	5.45	6.26	6.64	6.92	6.32	11.46	5.45	6.16	6.61	6.96	6.65	11.64
419	F	8.56	7.21	8.15	7.34	7.01	10.66	8.71	7.23	8.15	7.07	6.46	10.66	5.76	5.96	7.35	6.91	6.94	11.21	5.71	5.96	7.35	6.85	7.02	11.28
420	F	8.15	6.98	7.65	6.82	6.5	10.17	8.2	6.84	7.66	7.01	5.95	10.47	5.65	5.85	6.62	7.24	6.77	11.39	5.63	5.85	6.62	7.25	6.92	11.59
421	F	9.52	7.59	8.12	7.63	7.27	10.65	9.52	7.59	8.12	7.65	7.18	10.64	6.16	6.72	7.45	8.09	7.24	12.1	6.16	6.72	7.64	7.5	7.5	12.27
422	M	9.48	7.12	8.43	8.33	7.46	10.69	8.84	7.18	7.46	7.52	7.16	10.84	5.78	6.5	7.1	7.23	7.34	12.18	5.63	6.4	6.93	7.07	7.87	12.3
423	M	9.19	7.12	7.13	7.52	6.72	10.6	9.01	7.16	7.28	7.49	7.16	10.58	5.17	5.91	6.53	7.66	6.92	11.82	5.17	6.19	6.53	7.53	7.11	11.91
424	M	9.1	7.78	8.87	7.99	8.17		8.97	7.72	8.87	8.4	8.11	11.52	5.7	6.59	8	7.92	8.41	12.38	5.64	6.54	7.8	8	8.93	12.15
425	F	8.25	6.4	7.53	6.5	6.38	9.52	8.24	6.41	7.53	6.45	6.46	9.59	5.21	5.74	6.36	7.13	6.83	11.1	5.21	5.54	6.46	6.85	7.13	10.93
426	M	9.08	7.29	7.53	7.73	6.95	11.25	8.84	7.29	7.53	7.72	6.98	11.24	5.98	6.31	7.19	7.3	7.09	11.41	5.98	6.21	7.23	6.92	7.21	11.68
427	M	8.49	6.79	7.53	6.47	6.51	10.72	8.61	6.79	7.51	6.65	6.32	10.75	5.49	5.78	6.85	6.55	6.34	11.22	5.61	5.71	6.71	6.58	6.41	11.22
428	F	9.41	7.18	7.88	7.38	7.02	10.93	9.41	6.69	7.84	7.54	6.85	11.3	5.88	6.35	6.65	7.35	7.35	11.36	5.87	6.32	6.81	7.81	7.56	11.35
429	M	8.36	6.47	7.58	7.93	7.4	10.83	8.36	6.48	7.73	8.01	7.24	11.23	5.84	6.99	7.05	7.65	7.42	11.88	5.88	6.64	7.28	7.65	7.01	12.09
430	M	8.75	7.23	7.98	7.31	6.58	10.16	8.75	6.79	7.85	7.34	6.61	10.05	5.28	6.38	7.34	7.38	6.83	11.84	5.28	6.42	7.34	7.18	6.94	11.55
431	M	8.82	6.9	7.99	7.27	7.33	10.83	8.82	6.9	7.95	7.5	7.29	10.78	6.04	6.63	7.05	7.2	7.91	11.72	6.14	6.55	7.02	7.3	6.93	11.73

432	M	8.35	7.05	7.68	6.18	6	9.9	8.31	7.17	7.87	6.74	6.11	10.27	5.09	5.65	7.12	6.65	6.45	10.73	5.08	5.65	7.13	6.55	6.63	10.74
433	M	8.49	6.55	7.58	6.53	6.57	10.02	8.64	7.01	7.62	6.12	6.58	10.1	5.35	5.67	6.57	6.46	7.23	10.73	5.35	5.5	6.48	6.49	7.37	10.94
434	M	9.59	7.16	7.99	7.06	6.48	10.26		7.11	7.93	7.15	6.51	10.51	6	7.08	7.14	7.32	7.5	12.04	6.37	6.66	7.14	7.44	7.23	11.95
435	F	8.47	6.21	7.39	7.12	6.62	10.7	8.5	5.85	7.39	7.32	6.61	11.18	5.22	5.92	6.45	7.43	7.05	11.35	5.59	5.85	6.52	7.34	7.28	11.68
436	M	9.25	7.14	7.93	7.6	6.39	10.88	9.25	7.11	7.8	7.22	6.44	10.73	5.58	6.29	7.28	7.37	7.12	11.36	5.58	6.42	7.26	7.51	7	11.56
437	M	8.04	7.08	7.39	7	6.43	9.76	8.66	7.13	7.37	6.98	6.48	9.97	5.09	5.46	6.61	7.12	6.53	10.92	5.09	5.46	6.53	6.96	6.86	10.88
438	M	9.38	8.32	8.44	7.38	6.97	10.91	9.18	8.12	8.09	7.6	6.69	11.16	6.15	6.61	7.3	7.4	7.24	11.2	5.76	6.61	7.25	7.68	6.95	11.26
439	M	8.81	6.13	6.84	6.9	5.68	10.26	8.64	6.09	6.82	6.95	5.62	10.84	5.03	5.33	6.33	6.79	6.94	11.33	5.03	5.42	6.24	6.68	6.73	11.36
440	F	8.56	6.56	8.1	5.93	6.35	10.22	8.51	6.56	8.11	6.04	5.99	10.03	5.17	5.85	7.02	6.38	6.4	10.94	5.17	5.8	7.03	6.28	6.52	10.76
441	F	10.16	8.04	7.74	7.57	7.67		10.3	7.58	7.64	7.45	7.81	10.8	6.18	6.82	7.14	7.46	7.91	11.23	6.21	6.82	7.6	7.36	7.82	11.33
442	M	8.47	7.29	7.28	6.82	6.35	10.26	8.55	7.46	7.29	7.1	6.32	10.24	5.34	6.15	6.62	6.97	6.52	10.71	4.95	6.07	6.65	6.78	6.63	10.54
443	F	9.21	7.51	8.95	7.9	5.85	10.84	9.22	7.58	8.9	8.32	5.73	10.95	6.22	6.59	7.68	7.66	6.87	11.63	6	6.56	7.68	7.55	6.99	
444	M	8.83	7.36	7.93	6.92	6.93	10.57	8.98	7.34	7.97	7.09	6.84	10.97	5.7	6.51	6.95	6.81	7.45	11.31	5.7	6.51	6.81	7.04	7.1	11.39
445	M	8.54	7.1	7.58	6.48	6.52	9.85	8.68	7.1	7.58	6.27	6.21	10.34	5.14	5.78	6.56	6.95	6.94	10.98	5.14	5.86	6.56	7.01	7.15	11.1
446	F	9.24	6.84	7.92	7.85	6.41	10.09	9.08	7	8.12	7.24	6.97	10.2	5.84	6.42	7.32	7.25	7.16	11.13	5.88	6.42	7.2	7.44	7.15	10.9
447	M	8.58	6.71	7.52	6.84	6.04	10.47	8.41	6.88	7.47	6.89	6.04	10.64	5.41	5.72	6.65	6.88	7.02	10.6	5.41	5.77	6.69	7.02	6.62	10.31
448	F	8.83	6.27	7.36	6.54	6.63	10.15	8.82	6.57	7.37	6.48	6.62	10.08	5.4	5.76	6.47	6.86	6.71	10.71	5.5	5.96	6.47	6.77	6.73	11.15
449	F	7.91	6.48	7.77	6.66	6.36	10.1	8.12	6.48	7.77	6.86	6.21	10.14	5.06	5.76	6.67	6.92	6.72	10.76	5.03	5.76	6.67	6.9	6.68	11.04
450	M	9.27	7.43	7.68	7.33	7.28	10.41	9	7.43	7.68	7.25	7.28	10.55	5.8	6.39	6.93	7.11	7.13	11.23	5.78	6.41	6.94	7.27	7.34	11.29
451	M	8.59	6.57	7.76	7.28	6.4	10.73	8.59	6.57	7.7	7.18	6.51	10.93	5.58	6.24	6.97	7.37	7.23	11	5.58	6.06	6.97	7.32	7.33	11.21
452	M	8.61	7.03	7.4	7.08	5.95	10.3	8.68	7.38	7.42	7.14	5.91	10.33	5.1	5.66	6.54	6.97	7.16	11.37	5.06	5.66	6.53	6.95	7.41	11.38
453	M	8.78	6.69	7	6.84	6.95	10.02	9.18	6.34	7	6.94	6.75	10.22	5.35	5.41	6.06	7.04	7.33	11.01	5.35	5.41	6.06	6.95	7.08	11.24
454	M	8.1	6.75	7.79	6.7	6.1	10.34	8.1	7.14	7.66	6.63	6.35	10.81	4.92	5.69	7.3	6.86	6.29	10.59	5.09	5.69	7.3	7.13	6.44	10.73
455	M	8.78	7.52	7.24	6.85	6.71	11.03	9.13	6.9	7.2	6.79	6.86	10.98	5.64	6.49	6.34	6.86	7.27	11.72	5.71	6.49	6.26	6.9	7.41	11.79
456	F	8.63	6.16	7.95	7.31	6.34	10.46	8.63	6.83	7.95	7.11	6.5	10.76	5.42	6.25	6.96	7.05	6.97	11.3	5.42	6.33	6.86	7.22	7.2	11.24
457	M	8.71	6.72	7.77	7.03	6	10.77	8.69	6.72	7.82	7.05	6.17	11.16	5.39	5.87	6.6	7.03	7.02	12.01	5.37	5.87	6.59	7.15	7.35	12
458	M	9.26	7.36	8.21	7.32	7.06	10.26	9.42	7.21	8.3	7.36	6.64	10.47	5.64	6.56	7.23	7.36	7.08	10.53	5.82	6.57	7.03	7.48	7.21	10.57
459	M	7.73	6.16	7.35	6.79	6.11	10.25	7.83	5.95	7.29	6.74	6.29	9.98	4.76	5.37	6.39	6.71	6.64	9.84	4.79	5.37	6.41	6.78	6.82	10.49
460	M	9.31	8.14	7.7	6.98	6.46	10.88	9.32	7.52	7.95	7.65	5.3	11.4	5.94	6.43	7.81	6.96	7.18	11.29	5.95	6.74	7.84	7.22	7.74	11.15
461	F	8.79	6.76	7.12	6.89	6.52	10.51	8.79	6.68	6.92	7.14	6.42	10.04	5.64	5.9	6.86	6.88	6.85	11.3	5.6	5.9	6.86	6.87	6.86	11.53
462	F	8.87	6.78	7.85	6.83	6.27	10.19	8.56	6.78	7.85	6.96	6.2	10.62	5.27	5.8	6.6	7.33	7.18	11.23	5.27	5.8	6.57	6.48	7.22	11.54
463	M	8.48	7.03	8.14	6.75	6.57	10.22	8.48	7.05	8.14	6.89	6.34	10.56	5.43	6.1	6.87	6.95	7.1	10.76	5.43	6.12	6.8	7.03	7.24	11.02
464	M	8.61	7.18	7.98	6.94	6.34	9.34	8.62	7.16	7.94	6.94	6.46	9.33	5.31	6.12	7.12	6.95	6.84	10.51	5.37	6.12	6.97	6.96	7.16	9.59
465	M	8.53	6.63	7.92	6.95	6.58	10.28	8.74	6.63	7.92	6.8	6.45	10.78	5.31	5.91	7.01	7.04	6.79	11.37	5.21	5.88	7.01	6.63	7.2	11.44
466	F	8.98	6.54	7.48	7.09	6.62	9.8	8.47	6.56	7.67	6.82	6.31	9.41	5.65	6.91	6.46	7.4	7.66	11.03	5.65	6.65	6.66	7.63	7.64	10.54
467	M	8.14	6.3	7.69	6.88	6.88	10.21	8.09	6.44	7.69	6.98	6.74	10.41	5.16	5.86	6.81	7.27	7.28	11.23	5.08	5.86	6.78	7.55	6.93	11.37
468	F	8.45	7.22	8.09	6.81	7.13	11.05	8.45	7.31	8.25	6.61	6.02	10.72	5.44	5.89	7.21	6.26	7.13	11.44	5.42	6.01	7.21	6.71	6.98	11.04
469	M	8.49	7.08	7.8	7.19	6.08	9.87	8.52	7.08	7.8	7.19	6.11	9.86	5.25	5.9	6.34	7.1	6.71	11.05	5.26	5.91	6.65	7.34	6.83	11.04
470	M	8.9	7.87	8.7	8.17	7.41		8.91	7.91	8.71	8.21	7.65	11.64	5.68	6.24	7.83	8.14	8.29	11.73	5.53	6.24	7.74	8.45	8.08	12.02

C.I : Central Incisor   **Pm1** : First Premolar

L.I : Lateral Incisor   **Pm2** : Second Premolar

C : Canine   **M** : First Molar

TABLE 2: INDIVIDUAL TOOTH MEASUREMENT FOR MALES

SAMPLE SIZE - 343

TEETH		MEAN ± S.D
MAXILLA	C.I	8.75 ± 0.51
	L.I	7.04 ± 0.48
	C	7.88 ± 0.38
	Pm1	7.12 ± 0.38
	Pm2	6.66 ± 0.46
	M	10.29 ± 0.53
MANDIBLE	C.I	5.49 ± 0.36
	L.I	6.09 ± 0.46
	C	6.93 ± 0.39
	Pm1	7.19 ± 0.35
	Pm2	7.08 ± 0.38
	M	11.21 ± 0.55

C.I : Central Incisor
L.I : Lateral Incisor
C : Canine
Pm1 : First Premolar
Pm2 : Second Premolar
M : First Molar

TABLE 3: INDIVIDUAL TOOTH MEASUREMENT FOR FEMALES

SAMPLE SIZE - 127

TEETH		**MEAN ± S.D**
MAXILLA	**C.I**	8.54 ± 0.44
	L.I	6.79 ± 0.50
	C	7.50 ± 0.34
	Pm1	6.68 ± 0.28
	Pm2	6.34 ± 0.28
	M	10.10 ± 0.55
MANDIBLE	**C.I**	5.38 ± 0.28
	L.I	5.98 ± 0.40
	C	6.69 ± 0.36
	Pm1	6.87 ± 0.29
	Pm2	6.78 ± 0.37
	M	10.94 ± 0.52

C.I : Central Incisor

L.I : Lateral Incisor

C : Canine

Pm1 : First Premolar

Pm2 : Second Premolar

M : First Molar

TABLE 4: LEFT AND RIGHT COMPARISIONS OF MESIO DISTAL WIDTHS OF INDIVIDUAL TEETH FOR WHOLE SAMPLE

SAMPLE SIZE – 127

TEETH		MEAN ± S.D
MAXILLA	C.I	0.01 ± 0.05
	L.I	0.01 ± 0.16
	C	0.01 ± 0.08
	Pm1	0.02 ± 0.09
	Pm2	0.02 ± 0.03
	M	0.03 ± 0.19
MANDIBLE	C.I	0.01 ± 0.02
	L.I	0.01 ± 0.02
	C	0.01 ± 0.07
	Pm1	0.01 ± 0.03
	Pm2	0.06 ± 0.09
	M	0.01 ± 0.16

C.I : Central Incisor
L.I : Lateral Incisor
C : Canine
Pm1 : First Premolar
Pm2 : Second Premolar
M : First Molar

TABLE 5: INTRA – EXAMINER VARIABILITY

SAMPLE SIZE – 200

TEETH		MEAN ± S.D
MAXILLA	C.I	0.01 ± 0.13
	L.I	0.01 ± 0.14
	C	0.01 ± 0.1
	Pm1	0.01 ± 0.1
	Pm2	0.01 ± 0.16
	M	0.01 ± 0.19
MANDIBLE	C.I	0.01 ± 0.08
	L.I	0.01 ± 0.10
	C	0.01 ± 0.11
	Pm1	0.01 ± 0.09
	Pm2	0.01 ± 0.11
	M	0.01 ± 0.13

C.I : Central Incisor
L.I : Lateral Incisor
C : Canine
Pm1 : First Premolar
Pm2 : Second Premolar
M : First Molar

TABLE 6: INTER – EAMINER VARIABILITY

SAMPLE SIZE - 30

TEETH		MEAN ± S.D
MAXILLA	C.I	0.01 ± 0.18
	L.I	0.01 ± 0.15
	C	0.01 ± 0.07
	Pm1	0.01 ± 0.09
	Pm2	0.01 ± 0.11
	M	0.01 ± 0.23
MANDIBLE	C.I	0.01 ± 0.06
	L.I	0.01 ± 0.07
	C	0.01 ± 0.03
	Pm1	0.01 ± 0.12
	Pm2	0.01 ± 0.09
	M	0.01 ± 0.19

C.I : Central Incisor

L.I : Lateral Incisor

C : Canine

Pm1 : First Premolar

Pm2 : Second Premolar

M : First Molar

TABLE 7: DESCRIPTIVE STATISTICS OF THE SUM FOR THE MEASURED VALUES FOR ANALYSIS

SAMPLE SIZE – 470

	SEX		P Value
	Male	**Female**	
UR	21.66 ± 0.95	20.52 ± 0.56	< 0.001
UL	21.65 ± 0.91	20.48 ± 0.50	< 0.001
LR	21.20 ± 0.87	20.34 ± 0.74	< 0.001
LL	21.28 ± 0.89	20.44 ± 0.79	< 0.001
SLI	23.18 ± 1.43	22.75 ± 1.25	< 0.001

UR : Sum of Upper Right Canine and Premolars

UL : Sum of Left Canine and Premolars

LR : Sum of Lower Right Canine and Premolars

LL : Sum of Lower Left Canine and Premolars

SLI : Sum of Lower Incisors

TABLE 8: DESCRIPTIVE STATISTICS OF MOYERS PREDICTION FOR WHOLE SAMPLE

SAMPLE SIZE – 470

	MAXILLARY ARCH		**MANDIBULAR ARCH**	
CATEGORY	**CASES OBESRVED**		**CASES OBESRVEI**	
2	7	1.4 %	6	1.2 %
3	5	1.0 %	16	3.4 %
4	63	13.4 %	50	10.6 %
5	306	65.1 %	311	66.1 %
6	48	10.2 %	62	13.1 %
7	16	3.4 %	11	2.3 %
8	9	1.9 %	5	1.0 %
9	16	3.4 %	9	1.9 %

D.F : 7 **P VALUE : < 0.001**

2 : Moyer's 15% Probability Value
3 : Moyer's 25% Probability Value
4 : Moyer's 35% Probability Value
5 : Moyer's 50% Probability Value
6 : Moyer's 65% Probability Value
7 : Moyer's 75% Probability Value
8 : Moyer's 85% Probability Value
9 : Moyer's 95% Probability Value

D.F : Degree of Freedom

TABLE 9: DESCRIPTIVE STATISTICS OF TANAKA JOHNSTON FOR WHOLE SAMPLE

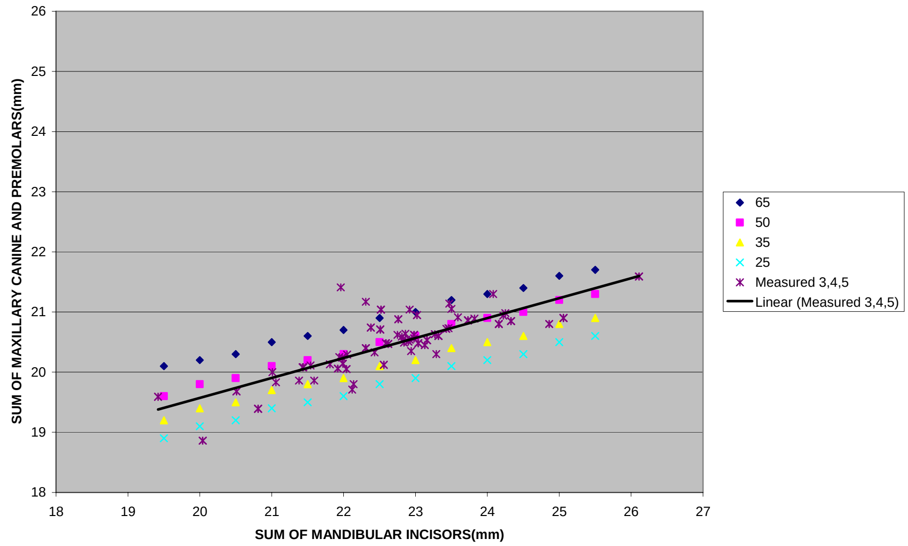
SAMPLE SIZE – 470

Sex	Arch	Sample Size	Variable Value	D.F	P Value
Male	**Maxilla**	343	SLI + 10.0	5	< 0.001
	Mandible	343	SLI + 9.5	5	< 0.001
Female	**Maxilla**	127	SLI + 10.0	5	< 0.001
	Mandible	127	SLI + 9.5	5	< 0.001

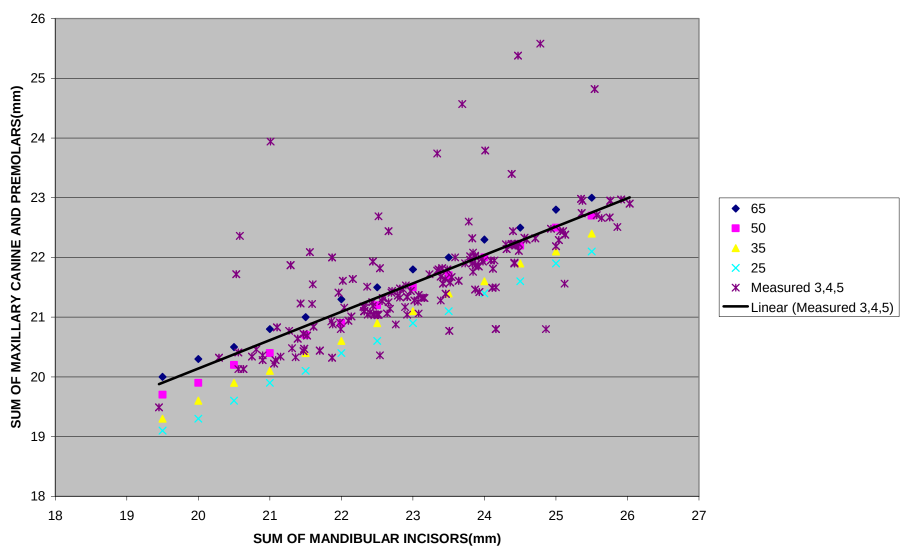
D.F : Degree of Freedom

SLI : Sum of Lower Incisors

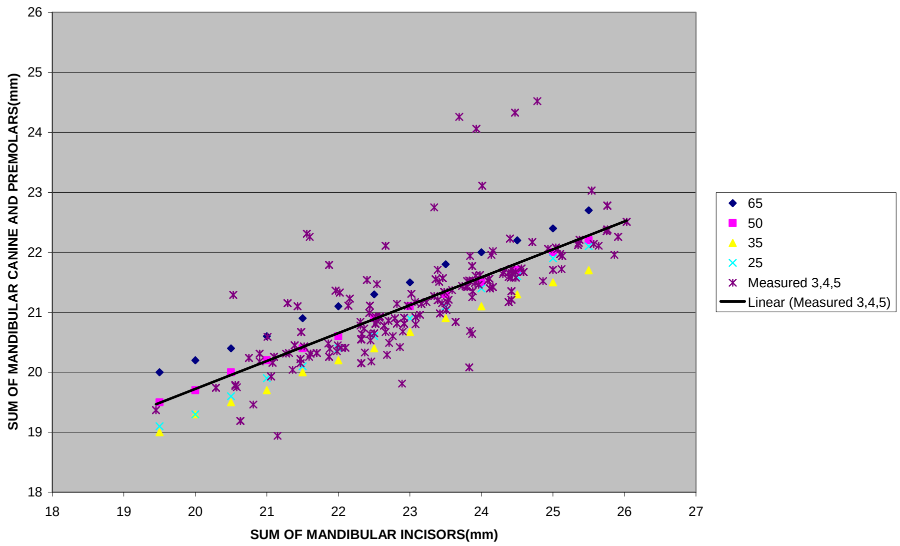
Graph.1: Graphic comparison of predicted values of unerupted maxillary canine and premolars derived from Moyer's prediction chart at various probability levels and the measured values of female subjects.



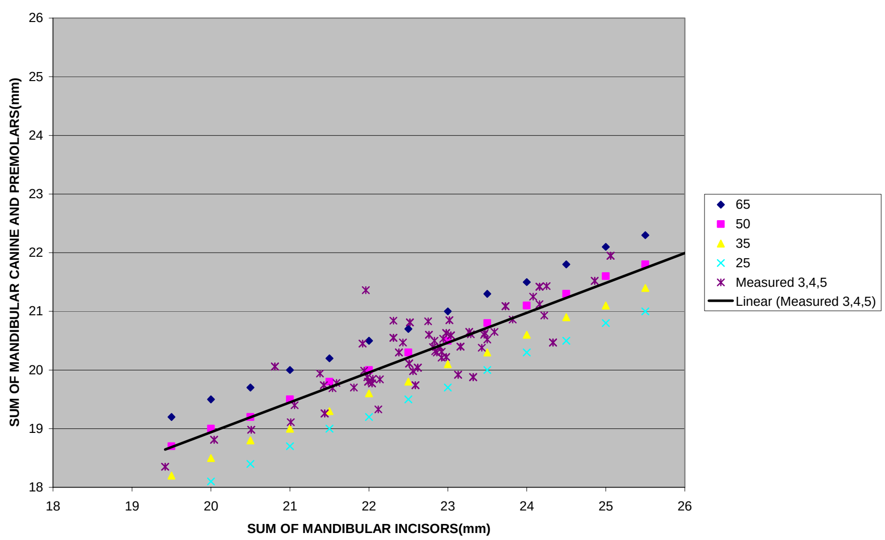
Graph.2: Graphic comparison of predicted values of unerupted maxillary canine and premolars derived from Moyer's prediction chart at various probability levels and the measured values of male subjects



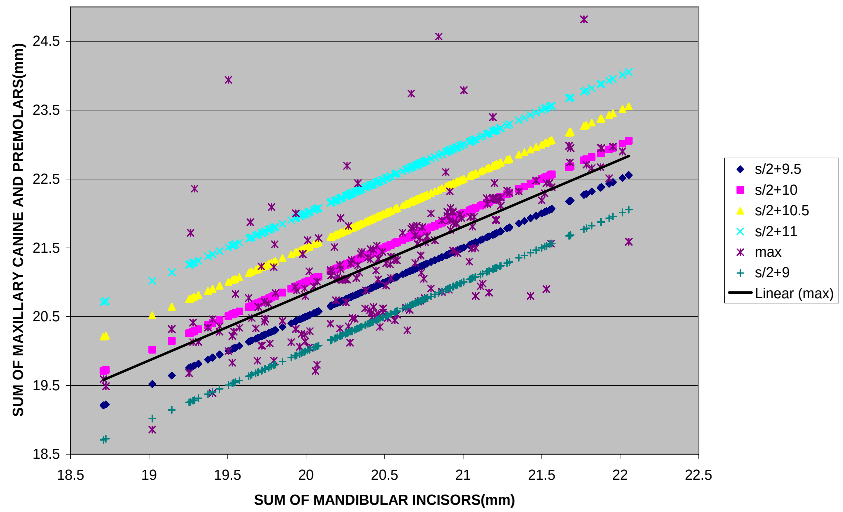
Graph.3: Graphic comparison of predicted values of unerupted mandibular canine and premolars derived from Moyer's prediction chart at various probability levels and the measured values of male subjects.



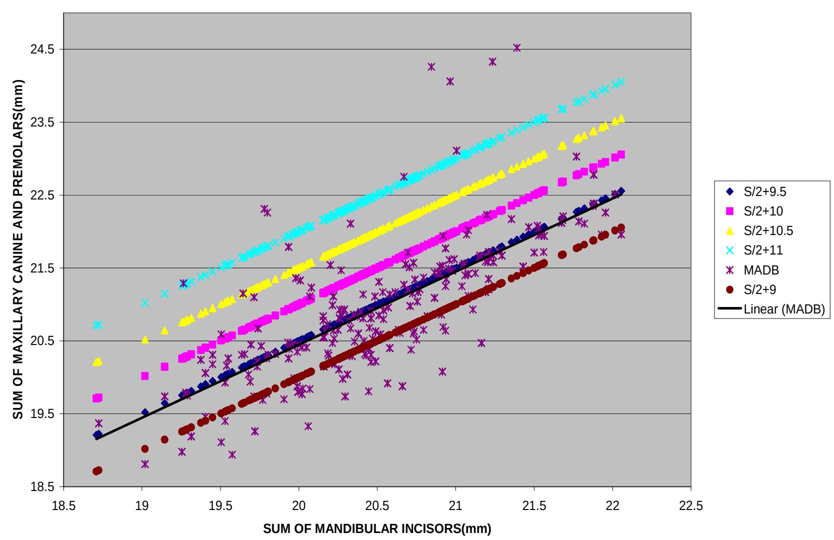
Graph.4: Graphic comparison of predicted values of unerupted mandibular canine and premolars derived from Moyer's prediction chart at various probability levels and the measured values of female subjects.



Graph.5: Graphic comparison of predicted values of unerupted maxillary canine and premolars derived from Tanaka Johnston equation at various probability levels and the measured values of whole subjects.



Graph.6: Graphic comparison of predicted values of unerupted mandibular canine and premolars derived from Tanaka Johnston equation at various probability levels and the measured values of whole subjects.



Discussion

Prediction of the sizes of unerupted canines and premolars, and the assessment of the space available to accommodate them, is the fundamental for early diagnosis and treatment planning during the mixed dentition period [46]. It is the pedodontist who has the first opportunity to identify the risk of malocclusion and to identify the risk of space loss by analyzing the mixed dentition.

One of the objectives of the tooth size arch length analysis is to obtain a most accurate prediction for each patient by reducing to a minimum errors involved in measurement [101].

Calculations from the prediction equations and tables were widely accepted and can be used with equal reliability both by a beginner and an expert, as it do not require sophisticated clinical training and saves time. It requires no specific equipment or radiographic projections and may be used for both arches. Although best done on dental casts, it can be done with reasonable accuracy in the mouth. Accuracy of Moyer's (1973) and Tanaka Johnston (1974) method was fairly good[97]. Although these two techniques were developed using the population of probable northern European ancestry, it had been proved by certain studies that it is difficult to apply in other populations, because of the variation in tooth size [63, 32, 81, 10, 107, 55, 83]. This led to evaluate the applicability of the Tanaka and Johnston (1974) and the Moyer's (1988) methods of predicting the size of permanent canines and premolars in Chennai school children in the present study.

The sample consists of 470 sets of study models of which 127 were girls and 343 were boys that were collected from the children of 12 to 15 year age group during the school dental health camps in and around Chennai. The sample criteria include Indigenous Chennai patients of south Indian descent, free from any systemic disease or serious health problems and also had no restorations, proximal wear, fractures or proximal caries with fully erupted permanent teeth from permanent first molar of one side to the antimere of other side.

A maximum age of 15 years was included to preclude any discrepancies due to significant proximal wear [25,107]. The dental casts were poured immediately after taking the impression with alginate, so as to reduce the distortion [4].

For both the Moyer's method and Tanaka and Johnston methods, the permanent mandibular incisors were chosen for predicting the size of unerupted canine and premolars in both the arches, since the mandibular permanent incisors will erupt early in the mouth and were easily and accurately measured both in the mouth and on the dental casts [44]. The need of establishing a prediction method that utilizes jaw and tooth dimensions after eruption of lower incisors arises, because primary crowding is usually noticeable only after the eruption of incisors. Jaw development will rarely provide the required space to accommodate primary crowding[105]**.** Other predictors have limitations because of local implicating factors such as lower first permanent molars which may be still covered by gingiva over the distal groove and the morphological drawbacks as in cases when combinations of permanent maxillary incisors due to deformity of maxillary lateral incisors [71].

Measurement reliability is one of the most important aspects of Odontometric studies and it refers to the ability to obtain the same measurement consistently over sequential measures [72]. In an attempt to improve the reliability of the measurements, a digital caliper was used to measure the mesio distal diameter whose measuring beaks were sharpened, which will reduce the eye fatigue and measures to the nearest 0.01 range [110]. Limited number of cases were measured (maximum of 5 cases) in each session to improve the reliability of measurement.

Mesio distal width is measured between two anatomical contact points of each tooth parallel to the occlusal surface of the teeth and also parallel to the vestibular surface of the model[44]. When a tooth was rotated or malposed in relation to the dental arch, the measurement was taken between the points on the approximate surface of the crown, where it was judged that normal contact should have occurred with the neighbouring tooth [37].

The values obtained by measuring the four seventy sets of casts were tabulated in the Table 1. The mean measured mesio distal widths of the individual teeth for male subjects was, for Central Incisor 8.75 ± 0.51, Lateral Incisor 7.04 ± 0.48, Canine 7.88 ± 0.38, First Premolar 7.12 ± 0.38, Second Premolar 6.66 ± 0.46, and First Molar 10.29 ± 0.53. in the maxillary arch and mean diameter for Central Incisor 5.49 ± 0.36, Lateral Incisor 6.09 ± 0.46, Canine 6.93 ± 0.39, First Premolar 7.19 ± 0.35, Second Premolar 7.08 ± 0.38, and First Molar 11.21 ± 0.55 in the mandibular arch. The mean measured mesio distal widths of the individual teeth for female subjects was, for Central Incisor 8.54 ± 0.44, Lateral Incisor 6.79 ± 0.50, Canine 7.50 ± 0.34, First Premolar 6.68 ± 0.28, Second Premolar 6.34 ± 0.28, and First Molar 10.10 ± 0.55 in the maxillary arch and mean diameter for Central Incisor 5.38 ± 0.28, Lateral Incisor 5.98 ± 0.40, Canine 6.69 ± 0.36, First Premolar 6.87 ± 0.29, Second Premolar 6.78 ± 0.37, and First Molar 10.94 ± 0.52 in the mandibular arch.

The paired t-test was used to compare left and right individual mesio distal diameter differences for the whole sample (N = 470).There was significant bilateral differences ($p<0.05$) was found with maxillary lateral incisors and first molars and, mandibular first molars and no statistical difference ($p>0.05$) was found with other teeth. The present findings were found in accordance with the other investigators (Moorrees et al [64], 1957; Moorrees and Reed [63], 1964; Garn et al [33], 1966; Moyer's et al [69], 1976; Bishara et al [9], 1986).

To measure the variation of mesio distal tooth widths between male and female subjects, statistical analysis of the data was based on the average mesio distal tooth widths of teeth on the left and right side of the dental arch. Since significant bilateral asymmetry had not demonstrated in the present data, to statistically compare the male and female mesio distal tooth widths of each tooth an average mesio distal of both left and right sides were taken for analysis. As the numbers of subjects in the male group are more than the female subjects, independents sample t-tests were performed to compare the mesio distal tooth widths [75, 77].

The results of independent t-tests showed that the mean mesio distal tooth widths of male subjects were consistently larger than females in both maxillary and mandibular arches ($p<0.01$) and also the sum of the mean mesio distal tooth widths of canine and premolars in all quadrants also showed significant difference ($p<0.01$) of larger teeth in male subjects than females. It was also interesting to note that mandibular incisor showed the smallest differences between the sexes. This was in consistent with the studies done by Dahlberg [22](1951), Moorrees [64] (1957), and Bishara et al [9](1986), Hattab et al [39](1976), Yeun et al [109](1996). Thus, this necessitates the need for separate prediction formula and probability tables for males and females.

Assessing the intra examiner variability, which ranged from 0.01 to 0.19 done in a 200 sample, where the error of difference ≤ 0.11 in all teeth except for maxillary central incisor, lateral incisor and first molar and, Mandibular first molar where it was ≤ 0.19. These values can be compared favorably with those reported by other investigators (Seipel [88], 1946; Moorrees et al [64], 1957; Keene [50], 1979; Buschang et al [16], 1988). Any differences in the mesio distal tooth width, if observed, may be a result of tooth size variability in the present sample and the prediction methods examined.

To check the inter examiner variability, a sample size of 30 was used, where the standard error of measurement is within 0.2 mm for all except maxillary first molar, where 0.23 was measured. This was in consistent with the studies done by Seipel [88], 1946; Moorrees et al [64], 1957; Keene [50], 1979; Buschang et al [16], 1988.

The results of the chi-square test for the differences between the sum of mesio distal diameter of canines and premolars in both the arches and the predicted values derived from Moyer's showed highly statistical significance only at 50% level of Moyer's probability chart for both maxilla and mandible.

Graphically, fig 1 to 4 represents the relative comparisons between the actual measurements of sample of Chennai population and the predictions derived from Moyer's probability chart at probability levels of 25%, 35%, 50%, 65% for the maxillary and mandibular arches of males and females respectively. Scattergrams in the preliminary analysis of the present data showed that Moyer's (1988) predictions at 5%, 15%, 75%, 95% confidence did not compare closely with the measured values of combined mesio distal diameter of canines and premolars in both the mandibular and maxillary arches of both males and females. These were, therefore subsequently left out for graphical comparison.

In all the graphic representation, it can be observed that Moyer's (1988) at 50% probability level showed the maximum coincidence with the actual measured values of the sum of mesio distal diameter of canines and premolars for the corresponding sum of the mesio distal diameter of mandibular incisors. Even the measured values of the sum of mesio distal diameter of canines and premolars in both the arches are falling between the 35% and 50%, when the linear regression line was drawn over plotted graph; the line followed a close association with the 50% probability level.

In the present study, the statistical evaluation showed a positive correlation between sum of the mesio distal diameter of permanent mandibular incisors and sum of mesio distal diameter of canines and premolars in mandibular arch ($r = 0.61$) and in maxillary arch ($r = 0.57$)

The correlation coefficients calculated in the present study differ from those published by Tanaka and Johnston method in that the mandibular incisors showed a minimal correlation, (0.61)for the mandibular buccal segments (Tanaka and Johnston, $r = 0.65$) compared to a more variation in correlation (0.57) for the maxillary buccal segments (Tanaka and Johnston, $r = 0.62$). Similar conclusions were seen in studies by Moorrees and Reed [63], 1964; Tanaka and Johnston [100], 1974; Ziberman et al [111], 1977; Diagne et al [24], 124:178-83.

On the other hand, predicted values of mesio distal diameter of canines and premolars derived from Tanaka and Johnston (1974) failed to show statistical significant differences for either separate or combined sexes. There was overestimation seen when the prediction equation applied at sum of the lower incisors plus 10 for maxillary arch and sum of the lower incisors plus 9.5 for mandibular arch which clearly represented in Table 9 graphs 5 and 6.

The present study revealed that estimated prediction of sum of mesio distal diameter of canines and premolars was closer to the 50% probability of Moyer's, but a slight over estimation was seen in the maxilla when the sum of the mesio distal widths of permanent mandibular incisors was more than 24 mm. The estimation was found to be more accurate for mandibular buccal segments at 50% probability value of Moyer's. Similar type of findings were seen in studies done by zibberman et al [111], 1977 for Israeli children and Alkhadra [2], 1993 for Saudi Arab populations where more accuracy in predicting mandibular buccal segment than compared to the maxillary buccal segments.

Even when there was a positive correlation between sum of the mesio distal diameter of permanent mandibular incisors and sum of mesio distal diameter of canines and premolars in mandibular arch, when Tanaka and Johnston equations are applied, with the Friedman two way Anova test, the estimated values were larger compared to the measured values. This was shown clearly in graphical representation of Tanaka and Johnston equations at different estimated levels to the measured values for maxilla (fig.5) and mandible (fig.6). Similar conclusions were obtained from studies by Moorrees and Reed, 1964; Ziberman et al [111], 1977; Alkhadra [2], 1993; Nourallah et al [71], 2002, where the predicted values were larger compared to the measured values. This clearly indicates that this method showed variation in prediction of mesio distal widths of canines and premolars in our population. So Tanaka and Johnston method cannot be applied for Chennai children.

Though the accuracy was maintained in the prediction by taking precautions, this study was based only on the complete erupted dentition of the children. If retrospective data with long term follow was available, we can correctly assess the mesio distal widths of unerupted canines and premolars and give applicable formula to predict the values for particular population .The present data can be kept as a baseline for future studies, to provide a new regressive equation to increase accuracy in predicting the mesio distal widths of unerupted canines and premolars.

Summary & Conclusion

The present study was conducted to evaluate the applicability of the Tanaka and Johnston (1974) and the Moyer's (1988) methods of predicting the size of permanent canines and premolars in Chennai school children.

The following conclusion were derived from this study

1. Significant sexual dimorphism in tooth sizes exist in Chennai population

2. There is significant bilateral symmetry seen in both the sexes.

3. Sum of the mesio distal diameter of permanent mandibular incisors can be used reliably to predict the sum of mesio distal diameter of unerupted canines and premolars.

4. Tanaka and Johnston (1974) method cannot accurately predict the mesio distal widths of unerupted canines and premolars of Chennai children due to the high variability in estimation.

5. The Moyer's (1988) prediction tables can be used to estimate the mesio distal widths of unerupted canines and premolars closer to 50% probability level.

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Annexure

Annexure I: Ethics Committee Approval

The institutional review board Consisting of Chairman, Dr.S.Ramachandran, Members of board -Heads of all the Department, Advocate Mr. Kamalakannan, Social worker Mr. KK Raman, General Medicine - Dr. U V Ramakrishnan MD and General Surgery - Dr. Parthasarathy MS have approved the study titled “Mixed Dentition Analysis – Applicability of Two Non Radiographic Methods in Chennai Children”.

Annexure IIa: Patient consent form used in this study - English

Please read and understand before filling in the consent form below.

Tooth size predictions STUDY will involve taking alginate impressions of your child's dentition and study casts will be made from them. The individual teeth from the study cast going to be measured and analyzed in the study. No invasive procedures shall be performed and the measurements taken constitute part of the treatment planning procedures. The orthodontic treatment schedules will not be affected in any way. The participation is voluntary and you or your child can withdraw from the study at any time. The results of the study will be confidential and anonymous. The results of the study are to be presented by Dr NAVEEN KUMAR.K to THE TAMILNADU Dr.M.G.R. MEDICAL UNIVERSITY as part fulfillment of the award of master's degree and as publications in a reputable scientific journal.

CONSENT FORM

Please fill the form in ink.

I, (father, mother or guardian)............... herewith grant permission for my child… …….to participate in the above-mentioned study. No invasive procedures shall be performed and the measurements taken constitute part of the treatment planning procedures

I have been informed, in writing, of the procedures to be performed. I understand that the study is voluntary and that the results of the study will be anonymous.

Name:	Witness:
Signature:	Signature:
Date:	Date:

ராகாஸ் பல் மருத்துவமனை மற்றும் கல்லூரி,

உத்தண்டி, சென்னை.

குழந்தையின் மேல் மற்றும் கீழ்தாடைகளை 'அல்சினேட்' மூலம் அளவு எடுத்து, மாடல் செய்து, பற்களின் எதிர்கால அளவை நிர்ணயம் செய்ய ஒரு ஆய்வு நடத்தப்படுகிறது. இவ்வாறு செய்வதால் உங்கள் குழந்தையின் பற்களின் – சீர் அமைப்பு சிகிச்சை எந்த விதத்திலும் பாதிக்கப்படாது. மேற்கண்ட முறையில் அளவு எடுப்பதால உங்கள் குழந்தைக்கு எந்த விதத்திலும் பாதிப்பு ஏற்படாது. உங்கள் முன் அனுமதி பெற்றே இந்த திட்டத்தில் உங்கள் குழந்தை சேர்த்துக் கொள்ளப்படுவர். நீங்கள் தன்னிச்சையாக இந்த ஆய்வுத் திட்டத்திலிருந்து எக்கட்டத்திலும விலகிக் கொள்ளலாம். இந்த ஆய்வில் சேர உங்கள் முன் அனுமதியை கீழ்வரும் படிவத்தில் கொடுக்கவும்.

ஒப்புதல் படிவம்

செல்வன்/செல்வி ....

தந்தையாகிய/தாயாகிய .... நான் மேற்கண்ட படி அளவு எடுத்து ஆய்வு செய்வதை ஒப்புக் கொள்கிறேன்.

பெயர்

கையொப்பம்

தேதி :

Annexure III: Proforma used in the Study

Serial No: Date:

Name: Age / Sex:

Address:

Occupation of the parent:

Family income:

PRENATAL HISTORY

Health of the mother during pregnancy:

Whether any drugs taken during pregnancy: Y / N

History blood incompatibility between parents: present / absent

NATAL HISTORY

Delivery: full term / premature

Type of delivery: normal / forceps / caesarian

Any other abnormality at birth:

POST NATAL HISTORY

Feeding type & Time period: Breast / Bottle / Combination

Milestone of development:

MEDICAL HISTORY

Any childhood disease. If yes, specify:

Any mental or physical disability:

Is the child on any treatment or drug therapy:

DENTAL HISTORY

Dietary habits : veg / non veg

Oral hygiene measures : brush / fingers/ others

Detrimental oral habits : present / absent

GENERAL EXAMINATION

Built: Height: Weight:

EXTRA ORAL EXAMINATION

Shape of the head : Mesocepahlic / Dolichocepahlic / Brachycepahlic

Facial form : Square / Oval / Round

Facial symmetry : Symmetrical / Asymmetrical

Any other abnormalities:

INTRA ORAL EXAMINATION

Eruption status :

Molar relationship:

Canine relationship:

Incisor relationship: Overjet - Overbite –

Midline: Normal / Deviated

Arch – length: Maxilla: Adequate / Inadequate

Mandible: Adequate / Inadequate

Any other abnormality:

Appendix IV: Moyer's prediction chart (1988) used for the analysis

A. *For Mandibular Cuspids and Bicuspids*

21/12 (%)	19.5	20.0	20.5	21.0	21.5	22.0	22.5	23.0	23.5	24.0	24.5	25.0	25.5
MALES													
95	21.6	21.8	22.0	22.2	22.4	22.6	22.8	23.0	23.2	23.5	23.7	23.9	24.2
85	20.8	21.0	21.2	21.4	21.6	21.9	22.1	22.3	22.5	22.7	23.0	23.2	23.4
75	20.4	20.6	20.8	21.0	21.2	21.4	21.6	21.9	22.1	22.3	22.5	22.8	23.0
65	20.0	20.2	20.4	20.6	20.9	21.1	21.3	21.5	21.8	22.0	22.2	22.4	22.7
50	19.5	19.7	20.0	20.2	20.4	20.6	20.9	21.1	21.3	21.5	21.7	22.0	22.2
35	19.0	19.3	19.5	19.7	20.0	20.2	20.4	20.67	20.9	21.1	21.3	21.5	21.7
25	18.7	18.9	19.1	19.4	19.6	19.8	20.1	20.3	20.5	20.7	21.0	21.2	21.4
15	18.2	18.5	18.7	18.9	19.2	19.4	19.6	19.9	20.1	20.3	20.5	20.7	20.9
5	17.5	17.7	18.0	18.2	18.5	18.7	18.9	19.2	19.4	19.6	19.8	20.0	20.2
FEMALES													
95	20.8	21.0	21.2	21.5	21.7	22.0	22.2	22.5	22.7	23.0	23.3	23.6	23.9
85	20.0	20.3	20.5	20.7	21.0	21.2	21.5	21.8	22.0	22.3	22.6	22.8	23.1
75	19.6	19.8	20.1	20.3	20.6	20.8	21.1	21.3	21.6	21.9	22.1	22.4	22.7
65	19.2	19.5	19.7	20.0	20.2	20.5	20.7	21.0	21.3	21.5	21.8	22.1	22.3
50	18.7	19.0	19.2	19.5	19.8	20.0	20.3	20.5	20.8	21.1	21.3	21.6	21.8
35	18.2	18.5	18.8	19.0	19.3	19.6	19.8	20.1	20.3	20.6	20.9	21.1	21.4
25	17.9	18.1	18.4	18.7	19.0	19.2	19.5	19.7	20.0	20.3	20.5	20.8	21.0
15	17.4	17.7	18.0	18.3	18.5	18.8	19.1	19.3	19.6	19.8	20.1	20.3	20.6
5	16.7	17.0	17.2	17.5	17.8	18.1	18.3	18.6	18.9	19.1	19.3	19.6	19.8

B. For Maxillary Cuspids and Bicuspids

21/12 (%)	19.5	20.0	20.5	21.0	21.5	22.0	22.5	23.0	23.5	24.0	24.5	25.0	25.5
MALES													
95	21.2	21.4	21.6	21.9	22.1	22.3	22.6	22.8	23.1	23.4	23.6	23.9	24.1
85	20.6	20.9	21.1	21.3	21.6	21.8	22.1	22.3	22.6	22.8	23.1	23.3	23.6
75	20.3	20.5	20.8	21.0	21.3	21.5	21.8	22.0	22.3	22.5	22.8	23.0	23.3
65	20.0	20.3	20.5	20.8	21.0	21.3	21.5	21.8	22.0	22.3	22.5	22.8	23.0
50	19.7	19.9	20.2	20.4	20.7	20.9	21.2	21.5	21.7	22.0	22.2	22.5	22.7
35	19.3	19.6	19.9	20.1	20.4	20.6	20.9	21.1	21.4	21.6	21.9	22.1	22.4
25	19.1	19.3	19.6	19.9	20.1	20.4	20.6	20.9	21.1	21.4	21.6	21.9	22.1
15	18.8	19.0	19.3	19.6	19.8	20.1	20.3	20.6	20.8	21.1	21.3	21.6	21.8
5	18.2	18.5	18.8	19.0	19.3	19.6	19.8	20.1	20.3	20.6	20.8	21.0	21.3
FEMALES													
95	21.4	21.6	21.7	21.8	21.9	22.0	22.2	22.3	22.5	22.6	22.8	22.9	23.1
85	20.8	20.9	21.0	21.1	21.3	21.4	21.5	21.7	21.8	22.0	22.1	22.3	22.4
75	20.4	20.5	20.6	20.8	20.9	21.0	21.2	21.3	21.5	21.6	21.8	21.9	22.1
65	20.1	20.2	20.3	20.5	20.6	20.7	20.9	21.0	21.2	21.3	21.4	21.6	21.7
50	19.6	19.8	19.9	20.1	20.2	20.3	20.5	20.6	20.8	20.9	21.0	21.2	21.3
35	19.2	19.4	19.5	19.7	19.8	19.9	20.1	20.2	20.4	20.5	20.6	20.8	20.9
25	18.9	19.1	19.2	19.4	19.5	19.6	19.8	19.9	20.1	20.2	20.3	20.5	20.6
15	18.5	18.7	18.8	19.0	19.1	19.3	19.4	19.6	19.7	19.8	20.0	20.1	20.2
5	17.8	18.0	18.2	18.3	18.5	18.6	18.8	18.9	19.1	19.2	19.3	19.4	19.5

* Measure and obtain the mesio distal diameter of the four permanent mandibular incisors and the find the value in the horizontal row of the appropriate male and female table. Reading downward in the appropriate vertical column obtains the values for expected width of the cuspids and bicuspids corresponding to the level of probability we need.

Appendix V: Tanaka and Johnston (1974) regression equation used for the analysis

Maxillary canine and premolars (3, 4 &5) in one quadrant= (Sum of four mandibular incisors) /2 +11.00 mm (I used 9.00mm, 9.50mm, 10.00mm, 10.50mm, 11.00mm to check the application at different levels).

Mandibular canine and premolars (3, 4 &5) in one quadrant = (Sum of four mandibular incisors)/2 +10.5 mm (I used 9.00mm, 9.50mm, 10.00mm, 10.50mm, 11.00mm to check the application at different levels).

Appendix VI: Measurement chart used for the analysis

<table>
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<tr><td rowspan="12">MANDIBULAR ARCH</td><td rowspan="6">RIGHT</td><td>C.I</td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
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