The smile line of different ethnic groups in relation to age and gender

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Abstract

The position of the smile line was evaluated on the basis of standardized photographic images in a total of 733 subjects, 319 females and 414 males. The stratification encompassed three different ethnic groups: Germanic Caucasian, Roman Caucasian and Asian (Singhalese). The common feature of the smile line characteristics was that younger females (< 35 years) presented with higher smile lines than older males (> 35 years), a fact which was found in all ethnic groups. Thus, 33% of the younger Germanic Caucasian females and even 43% of the younger Asian females showed high or very high smile lines. On the other hand, half of the older Caucasian (Germanic and Roman) and 70% of the older Asian males presented with low smile lines. In only 6% of the Germanic Caucasian males over 35 years a high or very high smile line was observed. Due to the fact that more than half of the population did not yield the gingival margins or papillae during maximum smiling, the conclusion of the present study was that, in most cases, restorations should be placed in accordance with biological rather than purely esthetic principles. However, it was also shown that a third of the population would require reconstructions with esthetic demands owing to the fact that the gingival margins and papillae are at least partially visible during smiling. Hence, individual evaluations have to be made when determining the position of restoration margins.

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Introduction

In recent years, esthetic aspects have gained attention in reconstructive dentistry and hence, the discussion of the position of restoration margins has reemerged. Although it had been clearly shown that supragingival locations of crown margins ought to be preferred to subgingival locations from a periodontal point of view (WAERHAUG 1953, 1960, VALDERHAUG & BIRKELAND 1976, VALDERHAUG 1980, 1991), esthetic demands of patients, but also of professionals, appear to neglect this fact. Even though it has been demonstrated more recently that subgingivally located restorations are preventing neither secondary caries from occurring (HAMMER & HOTZ 1979, VALDERHAUG 1991) nor gingivitis, increased probing depth and gingival recession from developing (REICHEN-GRADEN & LANG 1989, VALDERHAUG 1991), restoration margins are frequently placed into a subgingival location. It is evident that a precise, subgingivally placed crown margin would cause only minimal retention of bacterial plaque and hence, developing chronic gingivitis may be maintained locally without concomitant loss of periodontal attachment. However, if the precision of restoration margins exceeds 150 μm, permanent damage to the periodontal tissues is most likely to occur (GLANTZ & NYMAN 1982, LANG et al. 1988). Overhanging restoration margins result in a change of the composition of the subgingival microbiota shifting from a predominantly gram-positive facultative anaerobic to a predominantly gram-negative, strictly anaerobic microbiota including the presence of significant proportions of presumptive periodontal pathogens (LANG et al. 1983). Hence, if restoration margins are to be placed subgingivally, a high precision of the restorations must be demanded.

The desire for an attractive smile and improved esthetics often motivate persons in modern society to seek dental treatment (SHEETS 1987, LEVINE 1995). In order to comply with such demands the professionals have the choice between a wide range of different cosmetic dental procedures ranging from simple chemical bleaching therapy, bonding techniques, placement of veneers to fixed prosthodontics including implant placement

(MAGNE & HOLZ 1994). Beyond the techniques of mucogingival surgery, periodontal procedures designed to enhance esthetics have also been developed. "Esthetic periodontics" consists of both minor surgical procedures such as root coverage (CELENZA 1995) and more comprehensive techniques such as ridge augmentation (ROSENBERG & CUTLER 1993). Resective gingival surgery in cases of extremely high smile lines with abundant exposure of gingivae ("gummy smile") have also been proposed (FEINMAN 1992, TOWNSHEND 1993).

Despite of these recent developments and – maybe – because of consumer demands it is often difficult to simultaneously consider esthetic and biologic aspects. Too often the esthetic demands will be preferred over the maintenance of gingival and periodontal health. Also, esthetics are often evaluated without considering the individual needs including the yielding of gingival tissue during smiling.

Only a few investigations made an attempt to determine the visibility of the gingival margin. CRISPIN & WATSON (1981 a, b) showed that the upper lateral incisor was the most visible tooth among 425 dental school students. Following a "normal" smile, the gingival margins of this tooth were visible in 66% of the students. Upon maximal smiling even 84% of the subjects revealed the gingival tissue of this tooth. However, this study did not include the influence of age, sex or ethnic origin of the subjects examined. In a study of 20- to 30-year-old students, TJAN et al. (1984) found a high and very high smile line being more frequent in women (14% and 75%, respectively) than in men (7% and 63%, respectively). In contrast, a low smile line was found more frequently in men (30%) than in women (12%). WICHMANN (1990), on the other hand, came to the conclusion that there was no significant difference in visibility of gingival margins between younger (average 25 years) and older subjects (average 55 years).

The aim of the present study was to investigate the influence of age, sex and ethnic origin on the location of the smile line in selected subjects.

Materials and Methods

Subject selection

Three different ethnic groups were selected for this study. The majority of the subjects to be examined were consecutively admitted patients from a private practice in the Canton of St. Gallen, Switzerland, representing a population group of Germanic Caucasian origin. Subjects originating from foreign regions such as the Balcan States were excluded from the study and hence, no subjects of Slavic origin were examined.

The second ethnic group was selected from the workers and staff of a dental manufacturing company in the Jura region of the Canton of Vaud, Switzerland, on the basis of availability. Again foreign workers with a different ethnic background than the Roman Caucasian were excluded from the examination. In addition to this ethnic group from the Canton of Vaud, further subjects of Roman Caucasian origin from the private practice mentioned above were examined. These included some Swiss Italians and some Swiss Raeto-Roman subjects.

The third ethnic group was an Asian population and was examined on the Maldive Islands. These subjects were selected on the basis of availability in a resort area and included indigenous people as well as Singhalese immigrants originating predominantly from Sri Lanka.

A total of 733 subjects, 319 females and 414 males were examined. The stratification encompassed three different ethnic groups, Germanic Caucasian, Roman Caucasian and Asian subjects as well as four different age categories which are depicted in Table I. The distribution of the subjects yielded a percentage of 55% for the Germanic Caucasian, 27% for the Roman Caucasian and 18% for the Asian populations, respectively. While the distribution of gender was equal between males and females for the Germanic Caucasian, the gender distribution was in favour of the males (3:2) for the Roman Caucasian and also in favour of the males (2:1) for the Asian populations.

Since no intraoral and only photographic examinations were performed, consent to participate in the study was obtained verbally.

Table I   Distribution of the subpopulations

population	age 11–20	age 21–35	age 36–50	age 51–71	total
Germanic Caucasian	48♀	50♀	50♀	50♀	198♀
	98	**100**	**101**	**100**	**399**
	50♂	50♂	50♂	50♂	201♂
Roman Caucasian	7♀	31♀	33♀	8♀	79♀
	17	**81**	**80**	**21**	**199**
	10♂	50♂	47♂	13♂	120♂
Asian	12♀	18♀	10♀	2♀	42♀
	41	**68**	**21**	**5**	**135**
	29♂	50♂	11♂	3♂	93♂
total	**156**	**249**	**202**	**126**	**733**

Examinations

The examinations were performed only once using a Nikon F90 camera (Tokio, Japan) and a Micro-Nikkor 105 mm f/2.8 D lens. The flash system consisted of the Nikon Macro Speedlight Controller AS-14 with a macro flash SB-21. The flash modules were always placed in a position sidewise to the lens. The magnification was maintained at 1:0.4, and Kodak Ektachrome ISO 100 film was used exclusively. All films were processed by the Photo Studio 13, Zürich, Switzerland. The headrest was aligned to allow the positioning of the head in the Frankfort horizontal plane to assure optimal angulation.

From each subject two different exposures were taken:
1) A wide mouth opening for smiling was photographed yielding the front teeth with the teeth in habitual contact (Fig. 1a).
2) After wide opening of the mouth for a heartily laughing the second picture was taken (Fig. 1b).

Fig. 1a   The two different exposures used for evaluation: Smiling with the teeth in habitual contact

Fig. 1b   The two different exposures used for evaluation: Heartily laughing

Evaluation of the smile line

Following processing the evaluation of the slides was carried out on a light screen (Color Control-Dia-Leuchtplatte, Just Normlicht GmbH, Weilheim an der Teck, Germany) under 2× magnification using a Dental X-Ray Reader (Svenska Dental, Upplands Väsby, Sweden).

The evaluation of the smile line was subsequently only carried out on the first photographs with the teeth in habitual contact. The smile line was defined as the relationship between the upper lip and the appearance of the upper incisors and canines or the gingival tissues of these teeth.

Four different categories with the following score definitions were used for assessment:

Score 0, Low smile line: Estimated as less than 25% of the interproximal gingivae visible and no gingival margins visible (Fig. 2a).

Score 1, Average smile line: Estimated as 25-75% of the interproximal gingivae visible, gingival margins possibly visible at single teeth (Fig. 2b).

Score 2, High smile line: Estimated as more than 75% of the interproximal gingivae visible, gingival margins scarcely visible (Fig. 2c).

Score 3, Very high smile line: A band of contiguous maxillary gingiva of at least 2 mm is visible in all regions of interest (Fig. 2d, 2e).

Fig. 2a   Smile line scores: Score 0

Fig. 2b   Smile line scores: Score 1

Fig. 2c   Smile line scores: Score 2

Fig. 2d   Smile line scores: Score 3

Fig. 2e   Smile line scores: Score 3

Concerning a detailed analysis of the visibility of the gingival margins and papillae, a dichotomous assessment (visible or not) was performed buccally at three sites of each tooth from the right maxillary first molars to the left maxillary first molars. Hence, three scores per tooth (distal papilla, buccal margin, mesial papilla) were given. If the evaluation of the photographs with wide opening of the mouth and heartily laughing resulted in greater exposure of gingival tissues than the evaluation of the photographs with the teeth in habitual contact, these higher scores given were used for analysis.

Furthermore, the presence or absence of a midline diastema was recorded.

On the photographs with the teeth in habitual contact the position of the lower lip in relation to the incisal edges was also evaluated. Again three different categories were defined:

Category 1: There is a *space* between lower lip line and incisal edges of maxillary incisors.

Category 2: The lower lip line is *touching* the incisal edges.

Category 3: The maxillary incisal edges are slightly *covered* by the lower lip line.

Statistical analysis

By and large the results have been analysed by using descriptive statistics. Owing to the fact that the scores for the smile line position and a categorisation for the position of the lower lip in relation to the incisal edges are non-parametric in nature, proportions of these scores or prevalences of categories are depicted. In case of comparison between patient groups non parametric

tests such as the chi-square test were used to test for independent variables. The Kruskal-Wallis one-way analysis of variance was used to evaluate differences in appearence of the smile line between the ethnic groups.

Reproducibility

From 733, 50 sets of photographs were chosen at random to be rescored and reanalysed in order to determine the reproducibility of all the parameters assessed. The reproducibility for the smile line position scores was 92% (46/50), while the visibility of the interproximal papillae or gingival margins, respectively, had a reproducibility of 97% (1742/1800). The reproducibility of the assessment of diastemas was 98% (49/50) as was the reproducibility of the position scores of the lower lip in relation to the incisal edges.

Results

An analysis of the appearance of the smile line for the total population is presented in Figure 3. From this graph it is evident that a higher smile line is generally found more frequently in the younger individuals (up to 35 years) than in the older subjects (more than 36 years) and in the female when compared to the male populations. In the Germanic Caucasian subjects, a smile line score of 2 or 3, indicating visible papillae and gingival margins throughout the dentition from the premolar to premolar region in the maxilla, was observed in approximately 33% of the younger females and in 29% of the older females (Fig. 4). These scores were given to approximately 25% of the younger male and only to about 6% of the older male populations. This, in turn, means that 94% of the Germanic Caucasian male population in the older age range (36 years and older) presented with a low smile line not yielding their gingival margin (Fig. 4). Significant differences were observed for young versus older men and for gender in the subgroups of more than 35 years of age (Table II).

Regarding the Roman Caucasian population similar results were observed (Fig. 5). There was no difference, however, between the younger and older females with respect to the distribution of the smile line scores of 2 and 3 versus 0 and 1 (Table II). In both age categories, approximately 24% with high smile line scores were noted revealing the gingival margins and the papillae. On the other hand, the Roman Caucasian male population presented with about 18% of the younger age group with smile line scores of 2 and 3, while the older age group had only approximately 12% with high smile line scores (Fig. 5). Significant differences were found only for gender in subjects > 36 years (Table II).

Slightly higher smile lines (but statistically not significant) were found in the Asian population when compared to Caucasians (Fig. 4, 5, 6). 43% of the young females and 25% of the older females yielded smile line scores of 2 and 3. In the younger male Asian population, 20% of the subjects, and in the older age group, 14% of the subjects scored 2 and 3 (Fig. 6). Significant differences were found for young versus older men (p<0.01) and for gender in both age cohorts (p<0.05, Table II).

In all three populations higher smile lines appear to be seen more frequently in females than in males and in younger than in older individuals. The highest smile lines were encountered in the younger Asian females (up to 35 years) and the lowest smile lines in the older Caucasian Germanic males (36 years and older).

From the standardized photographic documentation the visibility of the mesial papillae, the buccal gingival margin and the
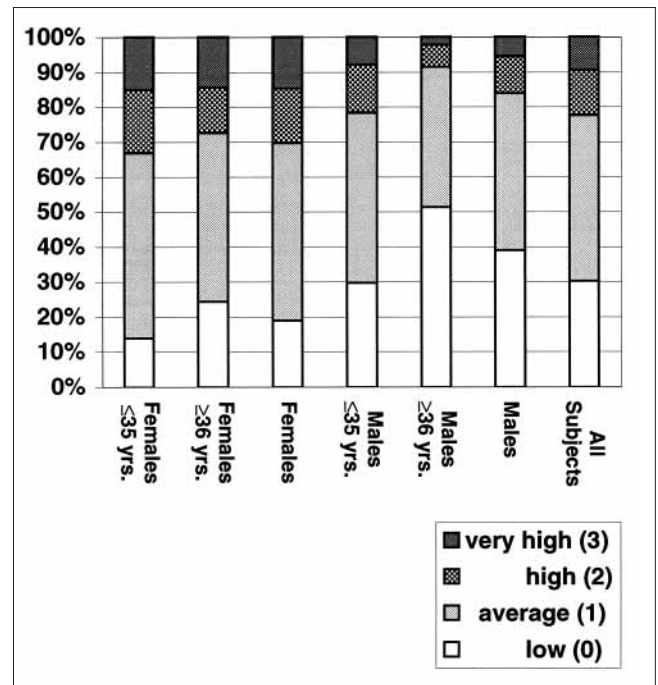

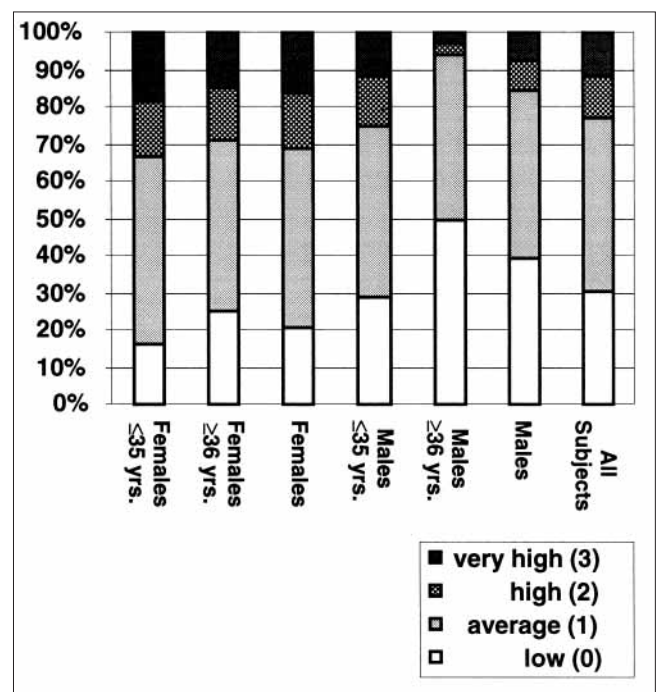Fig. 3 Smile line distribution (All subjects)

Fig. 4 Smile line distribution (Germanic Caucasian subjects)

distal papillae of each tooth from the maxillary right first molar to the maxillary left first molar was registered. As an example of this analysis, the findings of the Germanic Caucasian population representing more than 50% of the subjects of the present study, are presented in Figures 7–9. The female subjects of this ethnic group generally showed the mesial papillae of the front teeth to the premolar region up to the age of 50 years (Fig. 7). In the oldest age group of 51 to 71 years, it was evident that the

Table II   Statistical analysis of the different parameters

Statistical analysis of data in figures 4, 5 & 6				
condition 1	variable 1	variable 2	condition 2	probability
Germanic	smile line	age	female	n.s.
			male	<0.01
		gender	≤ 35 years	n.s.
			≥ 36 years	<0.01
Roman	smile line	age	female	n.s.
			male	n.s.
		gender	≤ 35 years	n.s.
			≥ 36 years	<0.01
Asian	smile line	age	female	n.s.
			male	<0.01
		gender	≤ 35 years	<0.05
			≥ 36 years	<0.05

Statistical analysis of data in figure 10				
condition 1	variable 1	variable 2	condition 2	probability
Germanic	diastema	age	female	n.s.
			male	<0.05
		gender	≤ 35 years	<0.05*
			≥ 36 years	<0.01
Roman	diastema	age	female	n.s.
			male	n.s.
		gender	≤ 35 years	n.s.
			≥ 36 years	n.s.
Asian	diastema	age	female	n.s.
			male	n.s.
		gender	≤ 35 years	n.s.
			≥ 36 years	n.s.

* = 1 side test

variable 1	variable 2.1	variable 2.2	condition 2.3	probability
diastema	Germanic	Roman	Asian	<0.05
	Germanic	Roman		n.s.
	Germanic		Asian	<0.01
		Roman	Asian	<0.01

Statistical analysis of data in figure 11 & 12				
condition 1	variable 1	variable 2	condition 2	probability
Germanic	lower lip	age	female	n.s.
			male	n.s.
		gender	≤ 35 years	<0.01
			≥ 36 years	<0.01
Roman	lower lip	age	female	n.s.
			male	n.s.
		gender	≤ 35 years	n.s.
			≥ 36 years	n.s.
lower lip	population	female	≤ 35 years	<0.01
			≥ 36 years	n.s.
		male	≤ 35 years	<0.05
			≥ 36 years	n.s.

Fig. 5   Smile line distribution (Romanic Caucasian subjects)
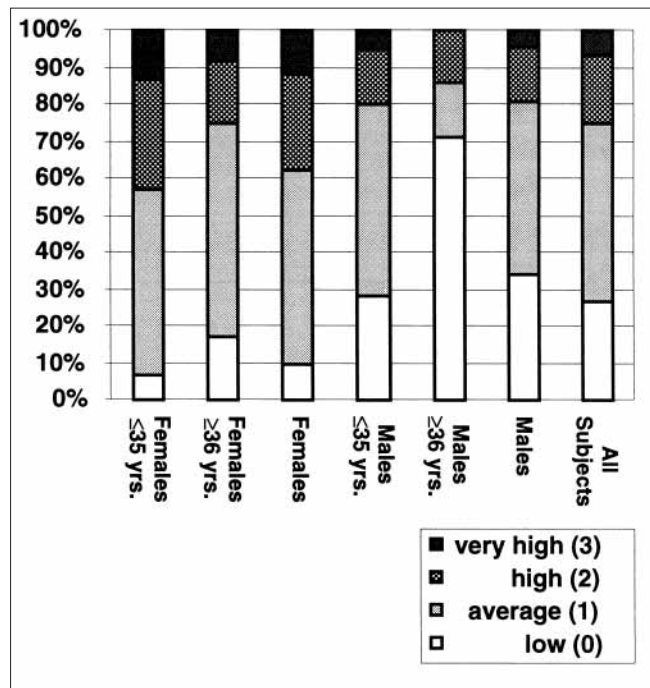
Fig. 6   Smile line distribution (Asian subjects)

mesial papillae were completely invisible in 20% of the subjects. 40% of the subjects did no longer show the mesial papillae of the first premolars. 60% did not show the mesial papillae of the second premolars, and 75% did not show the papillae of the first molars in this female age group (Fig. 7).

From Figure 8 it is evident that the Germanic Caucasian male subjects hid the mesial papillae to a greater extent than their fel-
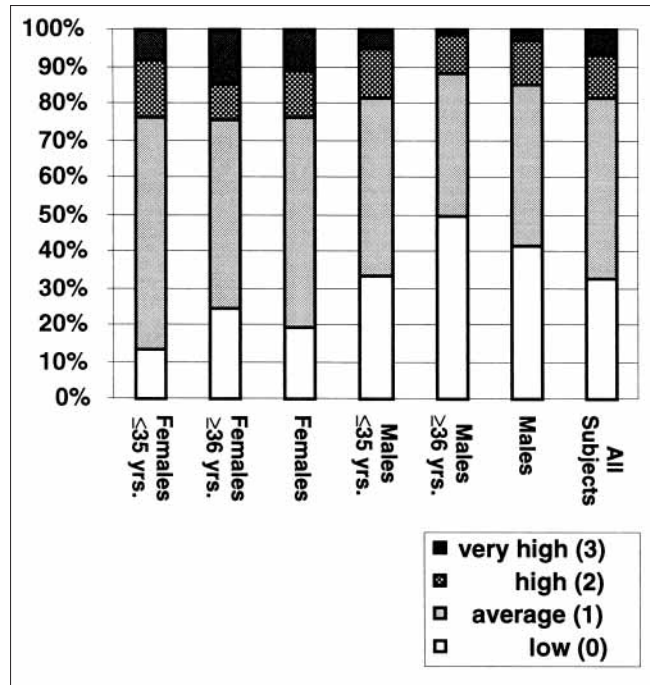
low female. 30% of the oldest age group of 51 to 71 years did not show the mesial maxillary papillae, and 50% hid the mesial papillae from the second premolars to the rear of the mouth (Fig. 8).

During maximum smiling (laughing) the buccal gingival margin throughout the dentition was not visible in approximately 50% or more of the older Caucasian Germanic subjects (Fig. 9). Again, there was a tendency for more individuals to hide their
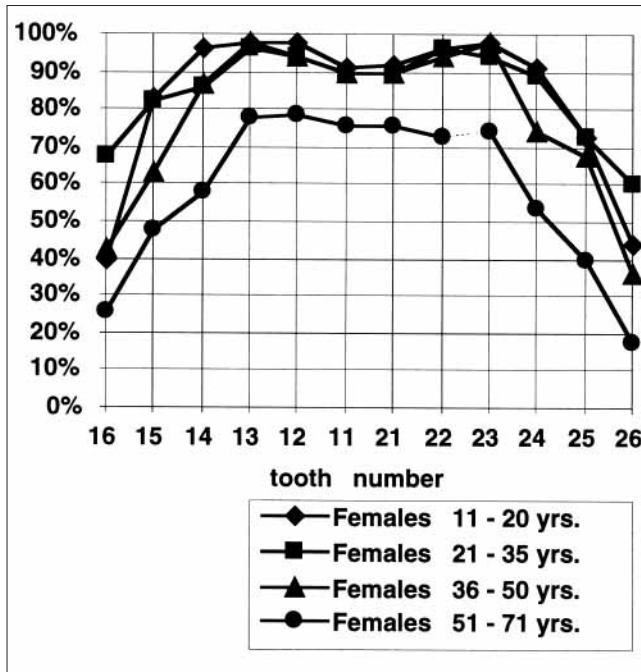
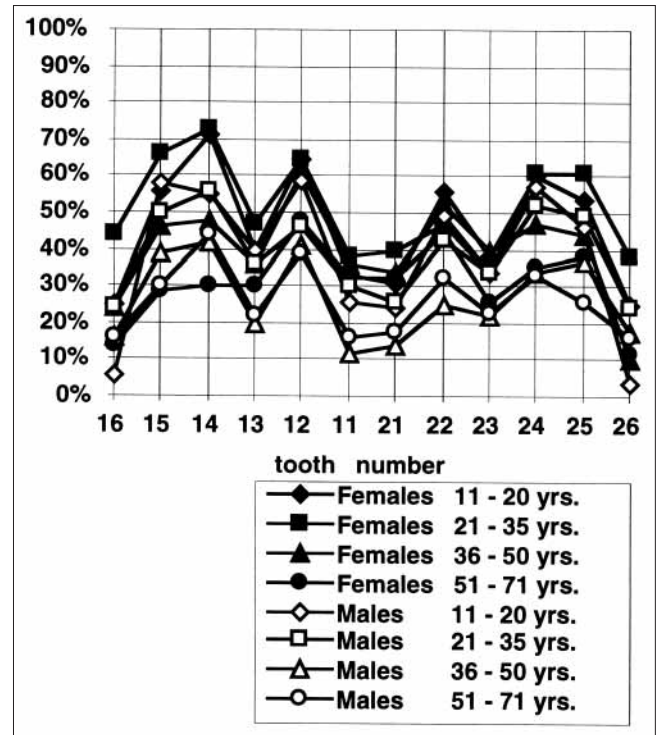Fig. 7   Visibility of mesial papillae of Germanic Caucasian females

Fig. 9   Visibility of buccal gingival margin of Germanic Caucasian subjects at maximal laughing
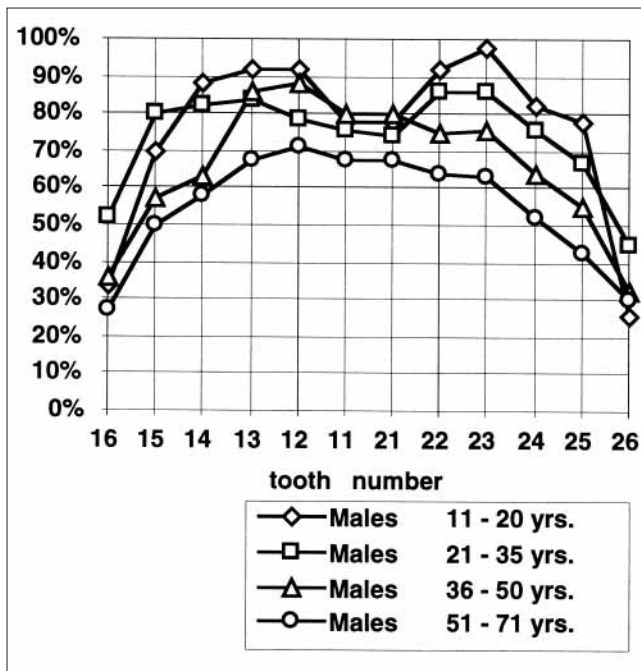

Fig. 8   Visibility of mesial papillae of Germanic Caucasian males

buccal gingival margins as people age, both for female and for male subgroups. In all age and gender groups, the buccal gingival margins of the maxillary lateral incisors were visible in a greater proportion of the subjects when compared with both central incisor and canine regions.

Also, older and male individuals rather hid the distal papillae of the incisors than younger and female individuals. Generally,

only about 70% of the subjects in the age group of 51 to 71 years showed the distal papillae of the incisors when laughing widely. On the photographic documentation, the distal papillae of the maxillary canines, premolars and molars were generally hidden by the anterior maxillary teeth.

The analysis of visibility of the mesial and distal papillae as well as the buccal gingival margins during maximum laughing was similar in the Roman Caucasian and the Asian groups.

From Figure 10 it is evident that in the Caucasian subpopulations there is a general trend for more subjects presenting with diastemas with increasing age. The highest prevalence was found in the Asian population, both in females and males. This prevalence amounts to more than 23%, and corresponds to the older male Germanic Caucasian subpopulation, where it was also over 25%. The lowest prevalence of only 6% was seen in the younger Germanic Caucasian females. Significant differences ($p<0.05$) were seen between the three populations. The Germanic Caucasian and the Roman Caucasian population were both significantly different from the Asian population ($p<0.01$). Only for the Germanic Caucasian statistical significance was found within the population: younger versus older males and gender in both age categories were significantly dependent ($p<0.05$, Table II).

The distance from the lower lip line to the incisal edge yielded a clear space in approximately 60% of all Germanic Caucasian and approximately 70% of all Roman Caucasian subjects (Fig. 11, 12). The lower lip covered the incisal edges of the maxillary front teeth in approximately 8 to 26% of the Caucasian population. The lowest prevalence of this coverage was seen in the older females of the Germanic Caucasian subpopulation and the highest prevalence in the younger male Germanic Caucasian subpopulation. During smiling the lower lip appeared to touch the maxillary incisal edges in about 8% of the young Roman Caucasian females, while these characteristics were found
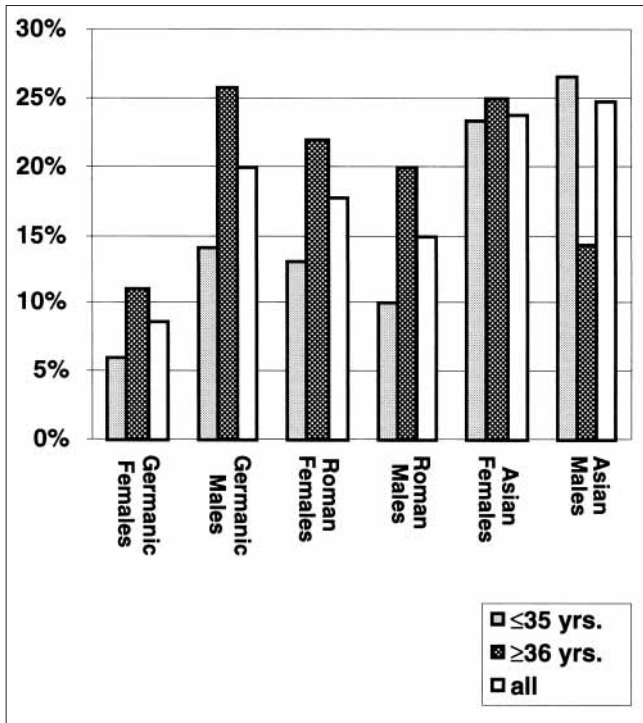
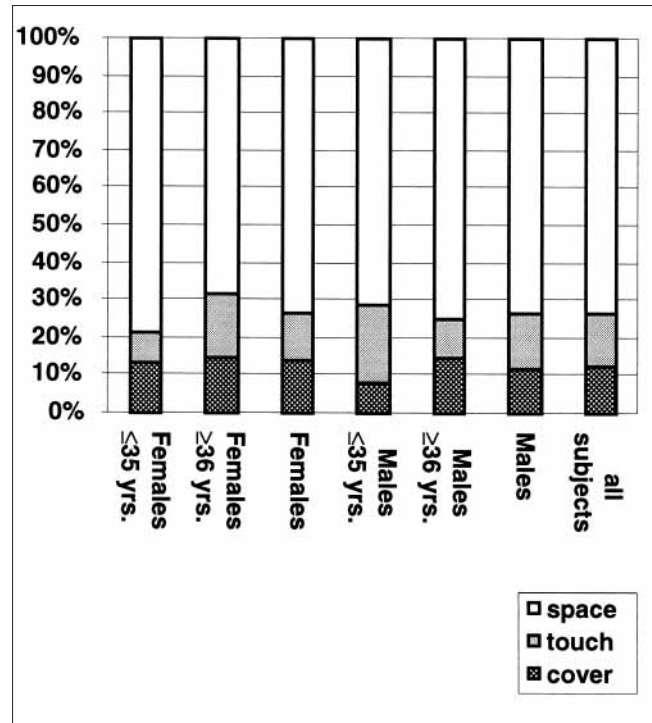Fig. 10   Frequencies of central diastema

Fig. 12   Lower lip situations for Caucasian Roman subjects
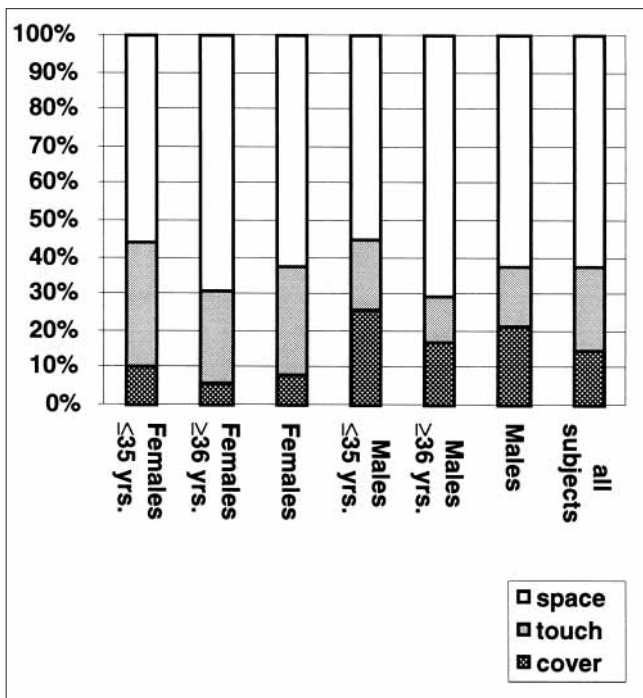

Fig. 11   Lower lip situations for Caucasian Germanic subjects

in a third of the younger Germanic Caucasian females (Fig. 11, 12). Within the Caucasian population, only the Germanic group showed significant differences for both age groups (p<0.01, Table II). While there is a statistically significant difference (p<0.05) between the appearance of the lower lip in relation to the incisal edges between young Germanic and Roman subjects, the older Caucasian subpopulations do not seem to show statistically significant differences, when analysed by gender (Table II).

Discussion

In the present clinical study the location of the smile line in relation to the maxillary teeth was evaluated on the basis of photographic images. Both exposures in habitual occlusion and maximum laughing as well as exposures with open mouth and laughing heartily were taken for evaluation. Since the visibility of the maxillary teeth was always evaluated on the image with the most exposure of the teeth, a true maximal visibility of maxillary teeth could be assured. Furthermore, the evaluation of the standardized photographs in habitual contact guaranteed for high reproducibility of the smile line assessment scores. In fact, 92% reproducibility assured not only a high reliability in the evaluation, but also an independence of the evaluation from subjective examination criteria. On the other hand it may be debated whether or not the photographs taken at one occasion were truly reflecting the position of the smile line, or whether or not the variability in the smile line position between different occasions would have resulted in a different image of the respective population. Although such subjective variations were not assessed in the present study and hence, cannot be excluded, it was felt that they were minimized by photographing the smile line of the subjects in habitual contact.

The patient selection for the present study resulted in 54% of the study population belonging to the Germanic Caucasian group, while only approximately 18% belonged to the Asian (Singhalese) ethnic group. It is evident that a stratification into four different age groups with another subdivision into male and female subjects, resulted in some strata with too few subjects to draw reasonable conclusions about the subpopulation in the Roman Caucasian and Asian groups. Nevertheless, the Germanic Caucasian group yielded at least 48 subjects per subpop-

ulation which assured adequate statistical power of the different age and gender strata. Hence, the analysis of the results of these subpopulations was limited to the Germanic Caucasian group. The common feature of the smile line characteristics in the present study was the fact that females below the age of 35 presented with higher smile lines than males above the age of 35. This was true for all the ethnic groups, and was most pronounced in the Asian population, where younger females (up to 35 years) with high smile lines comprised almost 50% of the population. Similar findings of higher smile lines for females have been described in Californian Caucasian (TJAN et al. 1984) and in New England Caucasian (PECK et al. 1992) subjects. However, in that study only younger subjects between 20 and 30 years of age were evaluated. In the present study a significant decrease in the extent of the smile line was evident in the older (more than 36 years) male populations. Such an age development has not been revealed in previous studies, although these aspects have been addressed previously (WICHMANN 1990). There are basically three explanations for this age dependent phenomenon:

1) It may be speculated that the facial height increases with the age (HERZBERG & HOLIC 1943, BAER 1956), a suggestion which has been documented by AINAMO et al. (1981). This, in turn, would mean that the upper lip may change dimension as people age.

2) The second possibility for a lower smile line in older males may be based on the fact that the gingival tissues present recessions as a result of past or present periodontal disease. In such a situation the lip line would be perceived as being positioned lower, even though it may not have changed. From the population examined in the present study, this latter possibility cannot be excluded.

3) A third and not less likely explanation than the first two is the fact that the elasticity of soft tissues decreases with age owing to age-related alterations in the connective tissue metabolism (MARKS 1988, LAPIÈRE 1990). This, in turn, may result in a "sinking" of the facial tissues thus accounting for the changes in the position of the upper lip.

Future studies should, therefore, incorporate an evaluation of the amount of gingival recession, hereby shedding light on the reasons for a decrease in visibility with age. The clinical significance of a longer lip projection is clear for the prosthetic reconstruction of teeth hiding preparation margins. However, these margins may become visible by gingival recession with an unaltered lip projection. The latter represents a well-known phenomenon in clinical dentistry and may be minimized by proper oral hygiene instruction and supportive patient care programs.

The high proportion of high smile lines in the young female Asian population may be explained on the basis of the cranial facial structures with bimaxillary protrusions frequently encountered in these subpopulations.

The extremely low smile lines encountered in half of the older male Caucasian (Germanic and Roman) subpopulations and in 70% of the older male Asian population would indicate that the considerations of therapists regarding the esthetic demands of reconstructions should be reevaluated. Rather than recommending to set esthetic priority before functional or health aspects, e.g. the subgingival placement of crown margins in the maxillary anterior region, it has to be realized that more than half of the population would not show the gingival margins or papillae during maximum smiling. Hence, in these subjects reconstructions should be placed in accordance with biological rather than purely esthetic principles. However, it is also clear from the present study that a third of the population would require reconstructions satisfying great esthetic demands owing to the fact that the gingival margins and papillae are at least partially visible during smiling. This is particularly true for the younger female population. The location of preparation margins, therefore, should be selected on an individual basis considering the patients' smile line.

In accordance with previous studies (CRISPIN & WATSON 1981a, b) the lateral incisors are generally more visible in total than the central incisors or canines. Therefore, special care should be taken to satisfy the patients' individual needs for esthetics when reconstructing maxillary lateral incisors.

It was evident that central diastemas were most frequently encountered (24%) among the Asian population. Again, this may be due to the fact that Asians present with a high prevalence of bimaxillary protrusions combined with single or multiple occurrence of diastemas. In the Caucasian populations there was a significant difference of the prevalence of central diastemas between Germanic females and Germanic males, while no significant differences were found for older or younger and male or female Roman Caucasian subpopulations. The least frequently encountered central diastemas were seen in only 6% of the younger Germanic Caucasian females. Most likely, this subpopulation was frequently offered orthodontic therapy to correct for central diastemas. This suggestion is further substantiated by the fact that older Caucasian individuals show significantly more central diastemas than those < 35 years. It appears to be a phenomenon of more recent years that esthetic corrections by orthodontics are more prevalent than a generation before. On the other hand, the possibility of diastema formation as a sequela of untreated periodontitis in the maxillary anterior region should not be overlooked.

In summary, the present study has demonstrated that high smile lines are encountered in only a third of the female populations. In males older than 35 years, a high smile line is observed in less than 15% irrespective of the race. In older Germanic Caucasian males, high smile lines are an uncommon observation (6%).

Acknowledgment

Zusammenfassung

Die Position der Lachlinie wurde anhand von standardisierten Fotoaufnahmen von insgesamt 733 Personen (319 Frauen und 414 Männern) untersucht. Die Zusammensetzung umfasste drei verschiedene ethnische Gruppen: Eine germanisch-kaukasische, eine romanisch-kaukasische und eine asiatische (singhalesische). Im Allgemeinen wurde festgestellt, dass jüngere Frauen (≤ 35 Jahre) eine höhere Lachlinie aufwiesen als ältere Männer (> 35 Jahre), eine Tatsache, die bei allen ethnischen Gruppen anzutreffen war. So zeigten 33% der jüngeren germanisch-kaukasischen Frauen und gar 43% der jüngeren asiatischen Frauen eine hohe oder sehr hohe Lachlinie. Auf der anderen Seite wiesen bei den Männern die Hälfte der älteren Kaukasier (germanisch und romanisch) und 70% der älteren Asiaten eine niedrige Lachlinie auf. Lediglich bei 6% der germanisch-kaukasischen Männer wurde eine hohe oder sehr ho-

he Lachlinie beobachtet. Aufgrund der Tatsache, dass die Gingivalränder bei über der Hälfte der Bevölkerung während des maximalen Lachens nicht exponiert werden, war die Schlussfolgerung der vorliegenden Studie, dass Restaurationsränder in den meisten Fällen eher in Übereinstimmung mit biologischen als mit rein ästhetischen Prinzipien platziert werden sollten. Es wurde jedoch auch gezeigt, dass die Gingivalränder und Papillen während des Lachens bei einem Drittel der Bevölkerung mindestens teilweise sichtbar sind, was erhöhte ästhetische Anforderungen an Rekonstruktionen bedeutet. Deshalb sollten beim Festlegen der Lage von Restaurationsrändern im sichtbaren Bereich der Mundhöhle immer individuelle Abklärungen gemacht werden.

Résumé

La position de la ligne du sourire a été évaluée à l'aide de photographies standardisées chez un total de 733 personnes (319 femmes et 414 hommes). Cet ensemble de personnes englobait trois différents groupes ethniques, à savoir germano-caucasien, romano-caucasien et asiatique (cinghalais). L'élément caractéristique commun de la ligne du sourire consistait dans le fait que les femmes jeunes (< 35 ans) présentaient des lignes situées plus en haut que celles des hommes plus âgés (> 35 ans), ceci étant vrai pour les trois groupes ethniques. Ainsi, 33% des jeunes femmes germano-caucasiennes et même un taux de 43% de jeunes femmes asiatiques montraient des lignes du sourire hautes ou très hautes. En revanche, la moitié des individus caucasiens masculins d'un âge plus avancé (germaniques ou romains) et 70% des sujets asiatiques masculins également plus âgés présentaient une ligne du sourire basse.

Une ligne du sourire haute ou très haute a pu être observée seulement chez 6% des hommes germano-caucasiens de plus de 35 ans. A cause du fait que plus de la moitié de la population examinée n'exposait ni le bord de la gencive ni les papilles lors d'un sourire maximum, la présente étude permet de conclure que, dans la majorité des cas, les marges des restaurations devraient être placées en accord avec des principes biologiques plutôt qu'en fonction de principes esthétiques. En revanche, l'étude a aussi démontré qu'un tiers de la population nécessiterait des reconstructions tenant compte des critères esthétiques, puisque le bord de la gencive et les papilles sont au moins partiellement visibles au moment du sourire. Pour toutes ces raisons, une évaluation individualisée semble être nécessaire pour déterminer la localisation des marges de restaurations.

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