

# Shaving

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## Abstract

**Background:** The effect of shaving systems on pseudofolliculitis barbae (PFB) is not known, nor has the high frequency of PFB in Indian population been explained. **Objective:** Pseudofolliculitis barbae is a foreign body inflammatory reaction surrounding an ingrown hair. The objectives are to define the effect of shaving systems on facial hair of men, to ascertain if a particular shaving system or technique relates to pseudofolliculitis barbae (PFB) and define the prevalence of PFB in male students, teachers, and staff of Jawaharlal Nehru Medical College, Belgaum, Karnataka, India and persons attending Private Skin Clinic, Belgaum. **Methods:** A pilot study of 100 and an actual study of 390 males was completed. Subjects were selected at random from Boys Hostel in Jawaharlal Nehru Medical College, Belgaum, District hospital, Belgaum, Private skin clinic Belgaum and subjects were also selected from the streets of Belgaum city, Karnataka, India. The subjects were briefed about the study and informed about the protocol which includes two questionnaires: a street questionnaire and a clinical questionnaire (Appendix A & B). The street questionnaire was handed to pilot subjects for completion. Subsequently the author filled in the clinical questionnaire. Sample size was calculated from the pilot study. In the analysis, the pilot study was included in the results from the total of 490 subjects. **Results:** Of the 490 subjects studied, 106 had PFB with the criteria of having at least micropapules or ingrown hair. PFB was clearly associated with shaving often and with thick hair growth ( $P = .001$ ). Shaving by stretching the skin and shaving against the grain were associated with higher prevalence and may be risk factors in PFB ( $P = .03$ ). Those shaving with a double edged razor had the highest prevalence of PFB, and none of the 10 using an electric razor had PFB ( $P = .116$ ). Close shaving requires tight stretching of skin which may be a factor in causing PFB. **Conclusion:** This epidemiologic methodology does not allow for analysis of cause, nonetheless, the data suggests close shave with multiple edge razors might be a risk factor in PFB, and should be studied in a controlled prospective study.

## INTRODUCTION

Pseudofolliculitis barbae is a foreign body inflammatory reaction surrounding an ingrown hair.<sup>1</sup> Shaving is a major cause especially in persons with wavy, kinky or curly hair. Among black men who shave, this disease is of particular concern, with estimates indicating a prevalence of between 45 to 80 percent.<sup>2-8</sup>

Craig hypothesized that close shaving requires tight stretching of the skin, a procedure which extends the hair further out of the follicle than normally.<sup>9</sup> When cut, such a hair retracts below the cutaneous surface, and then behaves like a plucked hair, subsequently piercing the follicular wall.<sup>9</sup> Close shaving is an important factor in the etiology of PFB. Although PFB is commonly seen in black men who shave regularly this may be seen in hirsute black women and in whites in the bearded areas.<sup>12,13</sup>

We report the results of epidemiologic study on the prevalence of PFB in adult males in India who shave. The

main goal has been to study the effect of shaving method on PFB.

## METHODS

The study includes a pilot ( $N = 100$ ) and the actual study; the latter consists of two stages and populations: a random sample from the street ( $N = 7$ ) filling in a questionnaire (street questionnaire, Appendix A) and a clinical sample ( $N = 483$ ) examined by the principal researcher with a structured clinical questionnaire (Appendix B). In the analysis the results from the pilot study and the actual study were combined

( $N = 490$ ). Consent for the study was obtained from the college authorities. Subjects were selected from Boys Hostel in Jawaharlal Nehru Medical College, Belgaum, District hospital, Belgaum, private skin clinic Belgaum and from streets of Belgaum city, Karnataka, India. 510 persons were approached & 490 participated.

The subjects were informed about the protocol which

includes two questionnaires: a street questionnaire and a clinical questionnaire (see appendix A & B).

The street questionnaire was handed to pilot subjects to be completed. The street questionnaire included age, details on the shaving system utilized, manufacturer of the razor blade utilized.

Subsequently the senior author completed the clinical questionnaire. In some cases well educated subjects filled in both the street and the clinical questionnaire. In some cases where the subjects could not complete the street questionnaire because the persons did not know English, the questionnaires were filled in by the author. 7 subjects were included in such case. The subjects answered the questions in vernacular language known to them. Precautions were taken by author that the subjects truly answered the questions. The number of subjects needed for the street and the clinical study was calculated from the data of the pilot study. 490 subjects were studied.

Street questionnaires (see above and Appendix A) were handed out in lecture halls to students of Jawaharlal Nehru Medical College, Belgaum: students (N = 92) and staff

(N = 49) at place during working hours (see below Inclusion criteria) and were to be completed immediately and collected. The subjects for the clinical study were 92 students, and 49 staff from Jawaharlal Nehru Medical College.

Subjects were selected from streets of Belgaum city and private skin clinic, Belgaum, Karnataka, India. The author completed the clinical questionnaire (Appendix B) for the subjects during a clinical session. For the subjects from the streets of Belgaum City and Private Skin Clinic, Belgaum, Karnataka, India, the street and clinical questionnaires were filled simultaneously.

Inclusion criteria were: 1. Male, age 20-65 years/ 2. Had been shaving whole face at least once weekly during the past 3 weeks 3. Living within 25 km from District Hospital Belgaum, Karnataka, India was the primary target but occasional subjects outside these limits were included.

Study subjects were: medical students 92, University staff 49, Clinical patients 336, men from street, engineering students, law student, arts student 13.

Almost all questionnaires were completed by author.

The criteria for the diagnosis of PFB was fulfilled when the

subject had at least micropapules or ingrown hair. They could have also pustules and any grade of severe inflammation. All subjects participated voluntarily and provided a written consent. Institutional Review Board is not needed in India.

## RESULTS

There was a linear correlation of the prevalence of PFB with education – the higher educated having a higher prevalence of PFB (from 16 to 28%;  $P = .050$ ) (Table 1) and a linear correlation of PFB with shaving frequency ( $P = .001$ ) (Table 2). The prevalence of PFB was also significantly associated with shaving by stretching the skin (26 vs 18%;

$P = .03$ ) (Table 3) and an association between shaving against the grain and the prevalence of PFB (33 vs 15%;  $P < .001$ ) (Table 4). Neck was the most common area of shaving against the grain, and 37% of those shaving against the grain on the neck had PFB ( $P < .001$ )

There was a higher prevalence of PFB in clean shaven persons or who had a French beard as compared to those with a mustache or just partly shaven ( $P = .004$ )

(Table 5). Those using electric razor or a barber shop had least PFB, and those using a double or triple edged razor had the highest prevalence of PFB (26%) (Table 6) although the result was not statistically significant. Thickness of the facial hair has a clear linear association with PFB (from 6 to 59%;  $P < .001$ ) (Table 7). 121 said growing a beard would affect employment. 117 were educated, 4 were not educated.

## Shaving

**Figure 1**

Table I. Education and prevalence of PFB, N (%)

	PFB	Total
Below matriculate	23 (19)	100
Matriculate	16 (21)	76
Collegiate	28 (20)	143
Graduate	36 (27)	135
Postgraduate	10 (28)	36
Total	106 (22)	490

$\chi^2 = 11.072$   $DF = 5$   $P = .050$

**Figure 2**

Table II. Frequency of shaving and prevalence of PFB, N (%)

	PFB	Total
Every day	16 (39)	41
Every other day	21 (28)	74
1-3 times a week	67 (21)	332
Less than every week	2 (5.0)	40
Total	106 (22)	490

$\chi^2 = 17.029$   $DF = 3$   $P = .001$

**Figure 3**

Table III. Shaving by stretching skin and the prevalence of PFB, N (%) ( $= .03$ )

	PFB	Total
No	52 (18)	284
Yes	54 (26)	206
Total	106 (22)	490

$\chi^2 = 4.400$   $DF = 1$   $P = .03$

**Figure 4**

Table IV. Shaving against the grain and the prevalence of PFB, N (%) ( $= .000$ )

	PFB	Total
No	47 (15)	315
Yes	59 (33)	175
Total	106 (22)	490

$\chi^2 = 23.434$   $DF = 1$   $P = .000$

**Figure 5**

Table V. Status of beard (at the time of filling questionnaire) and the prevalence of PFB, N (%) ( $= .004$ )

	PFB	Total
Partly shaven	11 (12%)	89
Mustache	63 (23)	279
Clean shaven	29 (35)	84
French beard	3 (42)	7
Total	106 (23)	459

$\chi^2 = 13.505$   $DF = 3$   $P = .004$

**Figure 6**

Table VI. Shaving system and the prevalence of PFB, N (%)

	PFB	Total, N
electric razor	0	10
barber shop	11 (17)	64
single edged razor	52 (21)	253
multiple edged razor	43 (26)	163
Total	106 (22)	490

$\chi^2 = 4.307$      $DF = 2$      $P = .116$

**Figure 7**

Table VII. Distribution of hair on face and PFB, N (%) ( = .000)

	PFB	Total, N
Thin	7 (6)	115
Normal	79 (24)	335
Thick	20 (50)	40
Total	106 (22)	490

$\chi^2 = 36.131$      $DF = 2$      $P = .000$

$\chi^2 =$  Chi-square;  $DF =$  Degrees of freedom

**DISCUSSION**

Craig hypothesized that close shaving requires tight stretching of the skin, a procedure which extends the hair further out of the follicle than normally.<sup>9</sup> When cut, such a hair retracts below the cutaneous surface, and then behaves like a plucked hair, subsequently piercing the follicular wall<sup>9</sup> and produces one or all four types of the lesions mentioned below.

A foreign body reaction where the hair tip penetrating the

follicular epidermis forms a chronic inflammatory papule. This type occurs commonly in blacks and may be in part to the natural kinkiness of the hair which causes it to curl up once the tip is stopped by penetrating the side of the follicle. A small pustule results from bacterial invasion of the irritated follicular opening. An ingrown hair where the tip is caught in the follicular epidermis and continued growth causes the shaft to double up on itself like a loop.

A hair, which penetrates the outer layers of the epidermis and may be pushed under it for 1/4<sup>th</sup> in. (0.64cm.) or so. Eventually it may break out spontaneously or be released by shaving or plucking.

Strauss and Kligman<sup>1</sup> established a different concept (by careful thick sectioning of skin biopsies), that all PFB lesions were reentry papules caused by leaving hairs too long after shaving. They stated that “Immediately after very close shaving with the usual safety razor, direct examination shows that many of the beard hairs are missed, as they hug the surface too closely. It is these very hairs which become ingrown. Those hairs that are cut must, of necessity, in view of their emerging practically parallel with the skin surface, be cut obliquely, producing a sharp pointed tip, which doubtlessly facilitates penetration into the skin.

As the hair extends along the surface, recurving towards the skin, it soon makes a dimple in the skin at the point of reentrance. As it continues to grow downward, the hair ruptures the epidermis and tends to complete the arc of the circle.<sup>1</sup> Pinkus<sup>10</sup> called this “loop hair” which belongs to the category 3 of Craig<sup>9</sup> as mentioned above.

Strauss and Kligman<sup>1</sup> state that they cannot support Greenbaum’s<sup>11</sup> contention that hairs typically enter the skin by penetrating through the follicular walls before emerging from the orifices as also hypothesized by Craig.<sup>9</sup>

However they mention that this type of ingrown hair occurs in two special circumstances:

When hairs are plucked

When with a straight razor shaving is exceedingly close.<sup>1</sup>

In the Strauss and Kligman<sup>1</sup> experiment using the straight razor which provided a closer shave than a safety razor by a barber on the beard area of one subject after the disease was brought into remission by not shaving it was found that the disease was reactivated within a few days in a severe form, with development of numerous follicular papules, despite the

fact that, in contrast to shaving with a safety razor, there was no doubt that every trace of external hair was removed. This occurs by the same mechanism as hypothesized by Craig.<sup>9</sup> We note that two types of ingrown hair occur: extrafollicular and intrafollicular.

In 1956, Strauss and Kligman<sup>1</sup> delineated the pathogenetic mechanism involved in the development of PFB. They described PFB as a strictly mechanical disorder arising in a person predisposed to it by the anatomy of his hair follicle. It was their finding that men with curved hair follicles, follicles that gave rise to curved hairs having a tendency to circle back toward the skin, were more likely to exhibit PFB after a variable period of regular shaving.

In evaluating therapeutic measures, these authors noted that refraining from shaving was not only the most effective but was a curative means of management. On the other hand, they observed the use of depilatories (ie, barium sulfide) to be very effective in controlling the problem of PFB in those persons who could tolerate the irritation ensuing from it. They attributed this favorable outcome to the propensity of these agents to remove hair flush with the skin surface, thereby avoiding the problem of cutting too close, which like plucking, often results in transfollicular penetrations of the skin.

Moreover, it was found the depilatories did not put a sharp point on the hairs as do razors. These sharp points render the hairs like curved needles and tend to facilitate their penetration of the skin.

Alexander AM<sup>12</sup> has reported a case in A 35 year-old black woman who had PFB in the pubic area. He states, the fact that pseudofolliculitis can develop in a woman also suggests genetic factors are probably operating in creating an individual predisposition for the development of pseudofolliculitis in any susceptible anatomical region, once regular shaving is instituted. Support for the theory found in an unpublished study he conducted in which 50 black men with PFB were questioned about a family history of the condition. Fifty two percent of these men stated that they had fathers or brothers, or both, with PFB. Furthermore, he was consulted by a set of identical male twins, both suffering from PFB both having the affliction for approximately the same duration, and both equally affected. He might add they stated that their father also had PFB.

Putting all available information together, it is clear that pseudofolliculitis knows no sexual or anatomical bounds. It

is a disorder that can develop in any person who is genetically predisposed. Regular shaving is the stimulus that precipitates the condition.

Close shaving is an important factor in the etiology of PFB. Although PFB is commonly seen in black men who shave regularly this may be seen in hirsute black women and in whites in the bearded areas.<sup>12,13</sup>

The estimated prevalence of PFB in the present pilot study was 29%. Those using electric razor or a barber shop had least PFB, and those using a double or triple edged razor had highest prevalence of PFB, although the result was not statistically significant, because double edged and triple edged razors cause close shave. Persons who were more educated and persons who shaved often wanted to be very clean shaven.

Most studies done on PFB are in blacks. No literature is available of PFB in Caucasians and Indians. We did not find literature on the effect of different types of shaving blades and shaving systems available in the market on normal hair & skin and no literature is available on the effect of shaving blades & shaving systems on PFB.

## CONCLUSION

The present study suggests that twin blades and triple blades may be related to PFB in India because of the 490 persons studied, 106 persons had PFB, 132 used twin blades and 30 used triple blades. Prospective controlled studies are required to verify or deny this hypothesis. Pilot study results were combined with actual study results, could be biasing factor in this study. Thick hair could be a reason why some people have to shave often. Shaving often and stretching the skin, wanting to be clean shaven could be a factor in causing PFB. Use of electric razor does not cause PFB. Shaving using single edged razor, in the direction of grain does not cause PFB. Close shaving with double edged and triple edged razor might be a risk factor in causing PFB. Single edged razor should be used in Indian males who shave, who are having PFB and who are not having PFB. Single edged razor should be used in black men who shave, who are having PFB and who are not having PFB. Single edged razor should be used in men of other races, who are having PFB and who are not having PFB. Shaving should be done in the direction of grain. Stretching the skin should be avoided while shaving. Double edged and triple edged razor should not be used in men who shave, who are having PFB and who are not having PFB.

Taken together, much remains to be learned before this troublesome “modern” (i.e.-shaving) but annoying entity is satisfactorily resolved.

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