METHOD FOR BRUSHING TEETH AND A TOOTHBRUSH USED FOR THE SAME

ABSTRACT

The inventor rejected the conventional method for brushing teeth with the brush head being parallel to the alignment of the teeth and found that a method for brushing teeth in the left and right direction in such a state that the brush head 21 is inclined relative to the alignment of the teeth can provide greater brushing effects as compared to the conventional method for brushing teeth with the brush head being parallel to the alignment of the teeth. The method for brushing teeth according to the present invention is a method for brushing teeth in the left and right directions in such a state that the brush head 21 is slightly inclined at an angle of 40° or less.
Fig 6

Fig 9
Fig 7

Extension

Counterforce from teeth

Portion for connection

Counterforce from teeth

Force in lateral direction

Force in longitudinal direction
Fig 8

Extension

Brush head

Portion for connection

Portion for connection that is not inclined
METHOD FOR BRUSHING TEETH AND A TOOTHBRUSH USED FOR THE SAME

BACKGROUND OF THE INVENTION

[0001] 1. Field of the Invention

[0002] The present invention relates to a method for brushing teeth, according to which food is removed to a great degree, and a toothbrush used for the same.

[0003] 2. Description of the Background Art

[0004] The head of a conventional toothbrush is provided linearly from the main body of the toothbrush, and therefore, a conventional tooth brushing operation, which is brushing in the left and right directions, poorly removes food particles remaining between the teeth and between the teeth and the gums.

[0005] Next, some conventional toothbrushes where the brush head inclines in the left or right direction relative to the main body are publicly known in patent and other publications.

[0006] It should be noted, however, that the method for brushing teeth with the inclined toothbrushes disclosed in all of these publicly known documents is a method for brushing teeth in the left and right directions in such a state that the brush head is parallel to the alignment of the teeth and not a method for brushing teeth in the left and right directions in such a state that the brush head is inclined relative to the alignment of the teeth.

[0007] That is to say, the purpose of the brush head being inclined in the left or right direction relative to the main body in all the publicly known documents disclosing an inclined toothbrush is to make it possible to brush teeth without inclining the grip, depending on the location of the teeth to be brushed, because the main body is inclined in the left or right direction so that the brush head is parallel to the alignment of the teeth when the grip is not inclined, whereas the grip must be inclined in order to make the brush head parallel to the alignment of the teeth, depending on the location of the teeth to be brushed, in the case where the brush head is provided linearly along the main body of the toothbrush.

[0008] According to the prior art, some inventors who had noticed poor performance of the toothbrushes where the brush head was provided linearly along the main body, that is to say, how poorly food particles remaining between the teeth and between the teeth and the gums were removed with such a toothbrush, concentrated on proposals of improved brushes where the diameter of the bristles of the brush, the structure of the bristle ends and other minor points were devised.

[0009] These minor improvements in the brush, however, may contribute to an increase in the performance of the brush to a certain extent but are insufficient in improving the performance to a great extent.

[0010] The first object of the present invention is to provide a method for brushing teeth according to which the effects of brushing teeth can be greatly improved as compared to a conventional method for brushing teeth with the brush head being parallel to the alignment of the teeth, where the method can be achieved irrelevant of minor improvements of the brush.

[0011] The second object of the present invention is to provide a toothbrush with a brush head that is inclined so as to satisfy the following two requirements a and b that contradict each other, and thus to make the method for brushing teeth according to the above-described first object practical.

[0012] a. Protrusion to the side due to the inclination of the brush head secures sufficient contact with the teeth in the upward and downward directions.

[0013] b. Teeth can be brushed with almost no burden being felt in the grip, though some twisting force from the main body is received by the user during brushing due to the inclination of the brush head, which is a problem that is not caused mechanically with the conventional linear brush heads and becomes greater as the amount of protrusion to the side increases.

SUMMARY OF THE INVENTION

[0014] The inventor rejected the conventional method for brushing teeth with the brush head being parallel to the alignment of the teeth and found that a method for brushing teeth in the left and right direction in such a state that the brush head is inclined relative to the alignment of the teeth can provide greater brushing effects as compared to the conventional method for brushing teeth with the brush head being parallel to the alignment of the teeth, and then completed a method for brushing teeth according to which the first purpose of the present invention can be achieved by confirming the effects through comparative experiments in a hospital.

[0015] This method for brushing teeth is described in further detail below. The method for brushing teeth according to the present invention is a method for brushing teeth in the left and right directions in such a state that the brush head is slightly inclined at an angle of 40° or less.

[0016] That is to say, in accordance with the method for brushing teeth according to the present invention, brushing in the left and right directions alternately provides moments during which the brush head makes and does not make contact with the areas between the teeth, and in addition, diagonal contact is made with a slight inclination at an angle of 40° or less so that food particles come off in such a manner as being wedged off.

[0017] When the user brushes his or her teeth in the lateral direction with a force of 1, a force of 1.19 for removing food particles from between the teeth works when the head is inclined at an angle of 40°, where the ratio of forces in the lateral direction versus the vertical direction is approximately 1:1.19 (the force in the vertical direction is higher by approximately 19%).

[0018] In addition, a force of 1.43 for removing food particles from between the teeth works when the head is inclined at an angle of 35°, where the ratio of forces in the lateral direction versus the vertical direction is approximately 1:1.43 (the force in the vertical direction is higher by approximately 43%).

[0019] Furthermore, a force of 1.73 for removing food particles from between the teeth works when the head is inclined at an angle of 30° (the force in the vertical direction is higher by approximately 73%).

[0020] For comparison, the force does not increase when the head is inclined at an angle of 45°, where the ratio of forces is approximately 1:1, thereby providing no wedging off effects.

[0021] That is to say, the angle at which the brush head is inclined is important, and there are no effects of wedging off food particles remaining between the teeth in the case where the angle of inclination is 45° to 90°.

[0022] As is clear from the above description, the first object of the present invention is achieved by a method for brushing teeth in the left and right directions with a tooth-
brush, where a brush head is provided at an end of a main body in such a manner that the brush head is inclined to a side from the main body by a length of \( \frac{1}{2} \) (half) or more of the width of the head at an angle of 40° or less, in such a state that the inclination of the brush head to a side is fixed during brushing.

Next, the second object of the present invention is to provide a method for brushing teeth and a toothbrush using the same that satisfy the following two requirements a and b.

- a. Protrusion to the side due to the inclination of the brush head secures sufficient contact with the teeth in the upward and downward directions.
- b. Teeth can be brushed with almost no burden being felt in the grip, though the user receives some twisting force from the main body during brushing due to the inclination of the brush head.

The above-described second object is achieved by the below-described method for brushing teeth and a toothbrush used for the same.

That is to say, in the method for brushing teeth and a toothbrush used for the same according to the present invention:

- a. The brush head is formed so that the length is two or more times greater than the width, and thus, a necessary length by which the brush head protrudes to a side (length K in FIG. 6) can be secured so that one stroke of the toothbrush sufficiently covers the contact width in the vertical direction of the teeth when the inclined brush head is moved in the directions to the left and to the right so that it is possible to put the method for brushing teeth according to the present invention into practice.

- b. In the case where the length of the brush head is two or more times greater than the width, a large twisting force is applied to the main body while brushing teeth (mechanical description follows), and in order to mitigate this, the protrusion of the brush head to a side is limited in such a manner that the smaller cross-section in the portion for connection at a location from extended in the direction towards the brush head overlaps an end of the brush head when projected from the front in the structure. Therefore, a force is applied to the portion of the brush head on the left side of the extended line along the portion for connection with the smaller cross-section, and at the same time, a counterforce is applied to the portion of the brush head on the right side from the teeth, and therefore, the moment of rotation for applying a twisting force is set off by the counterforce from the teeth so as to be nullified as long as the entire surface of the brush head makes contact with the teeth, and thus, the user can brush his or her teeth feeling almost no burden from the twisting force from the main body.

These and other objects, features, aspects and advantages of the present invention will become clearer from the following detailed description of the present invention when taken in conjunction with the accompanying drawings.

**DESCRIPTION OF THE PREFERRED EMBODIMENTS**

The method for brushing teeth according to the present invention and a toothbrush used for the same are described on the basis of the embodiments shown in the drawings.

FIGS. 1 and 2 show the method for brushing teeth according to the present invention and a toothbrush used for the same. The toothbrush has a main body (1), and a brush head (21) is provided to the head portion (2) that extends from an end of the main body (1) and is inclined to a side.

In the brush head (21), bristles made of a publicly known nylon resin, animal hair or the like are fixed to the head portion (2) in the area with a width w and a length a as shown in FIGS. 4 and 5.

As shown in FIGS. 4 and 5, the brush head (21) is provided to the head portion (2) that extends from an end of the main body (1) and is inclined to a side at an angle of 40° or less (desirably at an angle of 35° or less) with a protrusion length (length of the inclined brush head (21) in the direction perpendicular to the main body (1)) of \( \frac{1}{2} \) (half) of the width w or greater. In addition, the straight portion of the main body (1) for connection to the head portion (2) has a cross-section smaller than the base of the main body (1).

As shown in FIG. 4, the protrusion of the brush head (21) to a side is limited in such a manner that the above-described smaller cross-section in the portion of the main body (1) for connection at a location from extended in the direction towards the brush head (21) overlaps an end of the brush head (21) when projected from the front.

That is to say, the length of the protrusion of the brush head (21) to a side is K at the shortest and H at the longest, and the difference between H and K is the above-described narrower cross-section, and thus, it can be seen that the smaller cross-section, if the portion for connection is extended, overlaps an end of the brush head (21) when projected from the front (in further detail, FIG. 4 is a front diagram, and therefore, the brush head (21) in FIG. 4 is a projection which overlaps an extended portion for connection having the above-described narrower cross-section. FIG. 4 shows that it is not a mere contact, but clearly separates the brush into two sides.)
In order to describe what overlaps means, FIG. 8 shows a toothbrush without overlapping. That is to say, FIG. 8 shows a toothbrush having an inclined head disclosed in a publicly known document, which is a toothbrush used for a conventional method for brushing teeth where, “Teeth are brushed in the left and right directions in such a state that the brush head is parallel to the alignment of the teeth.”

That is to say, the conventional, publicly known inclined toothbrush is used in such a manner that the brush head is parallel to the alignment of the teeth when brushing teeth, and therefore, the resistance of the brush head received from the contact with the teeth is the same as that in the direction of the movement of the brush head, which is only the force of the resistance from the brush head in the longitudinal direction, and no force is applied to the brush head in the lateral direction.

The force applied to the brush head in the longitudinal direction barely causes the moment of rotation to the main body of the toothbrush, and therefore, the user barely receives a twisting force.

However, the method for brushing teeth with an inclined toothbrush according to the present invention is a method for brushing teeth in the left and right directions in such a state that the brush head is inclined relative to the alignment of the teeth, and therefore, as shown in FIG. 7, the brush head receives not only the resistance (i.e. force in longitudinal direction) from the contact with the teeth, but also a force in lateral direction applied simultaneously to the brush head due to the inclination of the brush head (the above-described wedging force) and vibrations of the counterforce from the teeth resulting from the contact with the uneven surface.

Accordingly, in addition to the force parallel to the direction in which the brush head moves due to the resistance (i.e. force in longitudinal direction) from the contact, a force applied to the brush head in lateral direction due to the wedging effects and vibrations of the counterforce from the teeth through the contact with an uneven surface, these two are forces (i.e. lateral direction force and counterforce) in the direction perpendicular to the direction in which the brush head moves (and these two are large forces that cannot be ignored), are applied to the brush head.

Both vertical two forces (lateral direction force and counterforce) apply to the brush head as the brush head moves. When the length of the brush head is two or more times greater than the width in such a manner that the length of the protrusion of the brush head to a side is great, the distance between the axis of the main body and the end of the brush head is large, which is the moment arm, and thus, the moment of rotation having a value gained as a product of the moment arm and the vertical two forces becomes large, and as a result, a large twisting force is applied to the main body when brushing teeth.

Consequently, the moment of rotation due to the vertical two forces during brushing that is unique to the method for brushing teeth in the left and right direction in such a state that the brush head is inclined to the alignment of the teeth becomes great, and thus, the user must brush his or her teeth while opposing the twisting force.

Accordingly, the length of the brush head is two or more times greater than the width as in the inclined toothbrush according to the present invention, the brush head receives a mechanical effect that is qualitatively different from the mechanical effect the brush head receives in the method for using a conventional inclined toothbrush.

That is to say, the inclination in the prior art is merely for the purpose of making it easy for the brush head to reach the rear teeth or making it easy to hold the toothbrush with a hand, where the brush head is moved along the alignment of the teeth when brushing the teeth. On the other hand, the inclination in the present invention is for the above-described two objects a and b of the present invention, and thus, the brush head receives a qualitatively different mechanical effect.

Namely, in the method for brushing teeth according to the present invention and a toothbrush used for the same:

a. The length of the brush head is two or more times greater than the width, and therefore, a necessary length of the protrusion of the brush head in the horizontal direction (length K in FIG. 6) is secured so that the inclined brush head can be merely moved in the left and right directions in such a manner that each stroke sufficiently covers the contact with the teeth in the full width in the vertical direction, and thus, it is possible to put the method for brushing teeth according to the present invention into practice.

b. In the case where the length of the brush head is two or more times greater than the width, a great twisting force is applied to the main body when brushing teeth as described above, and therefore, in order to mitigate this, the protrusion of the brush head to a side is limited in such a manner that the smaller cross-section in the portion for connection at a location if extended in the direction towards the brush head overlaps an end of the brush head when projected from the front in the structure.

That is to say, as shown in FIG. 7, the moment of rotation due to the vertical two forces, such as the force in the lateral direction due to a wedging effect and the vibrations of a counterforce from the teeth through the contact with an uneven surface, is set off with the counterforce from the teeth that is applied to the base of the brush head as long as the entire surface of the brush head makes contact with the teeth. Thus, the user can brush his or her teeth with feeling almost no burden of the twisting force from the main body when brushing his or her teeth.

With the above description being understood, some descriptions are added below in order to clarify the meaning of "extended." In FIG. 4, the portion of the main body (1) for connection to the head portion (2) (narrower cross-section) is linear instead of inclining. In the case where this portion for connection is tapered as in FIG. 8 (different from the brush head in the embodiments in FIGS. 1 to 4), the portion for connection that is not inclined may be extended, leaving the cross-section immediately before the inclination starts because the substantial portion for connection is that before the inclination starts (inclination of the head portion) (Though not shown in the embodiments, the present invention includes cases where the portion for connection is tapered.).

Next, the shape of the brush head (21) may be linear as in FIG. 4 or may be curved as in FIG. 5.

Furthermore, though the end portions of the brush head (21) in the longitudinal direction are round in FIGS. 4 and 5, they may be straight end portions (not shown).

The above-described method for brushing teeth according to the present invention and a method for using the toothbrush in an embodiment are described below.

As shown in FIG. 1, the user brushes his or her teeth while holding only the main body (1) of the toothbrush. Since
the brush head (21) inclines in the lateral direction, the inclination is fixed while the user brushes his or her teeth in the left and right directions due to the head portion being extended from the main body and integrally (i.e. brush head is integrated with the main body) inclined relative to the main body in such a manner that the brush head inclines relative to the spaces between the teeth when the brush head makes contact with the teeth, and thus, the remaining food particles receive force from the brush in the upward and downward directions. As a result, such effects are gained that the remaining food particles can be wedged off while brushing in the left and right directions equally to or more than while brushing in the upward and downward directions (The effects of wedging off diagonally are added, and therefore, the effects are more than those gained while merely brushing in the upward and downward directions.).

[0069] This is because the wedging off of food particles can be achieved due to the wedging off effects where, in the case where the brush head (21) inclines so as to protrude by a height y at an angle of 40° or less to a side of 1/2 (half) or more of the width, the portions of the teeth facing the spaces between the teeth repeat the moment during which they make contact with the brush head diagonally at an angle of 40° or less and the moment during which they do not make contact with the brush head while brushing in the left and right directions. When the user brushes his or her teeth in the lateral direction with a force of 1, a force of 1.19 for removing food particles from between the teeth works when the head is inclined at an angle of 40°, where the ratio of forces in the lateral direction versus the vertical direction is approximately 1:1.19 (the force in the vertical direction is higher by approximately 19%); in addition, a force of 1.43 for removing food particles from between the teeth works when the head is inclined at an angle of 35°, where the ratio of forces in the lateral direction versus the vertical direction is approximately 1:1.43 (the force in the vertical direction is higher by approximately 43%); furthermore, a force of 1.73 for removing food particles from between the teeth works when the head is inclined at an angle of 30° (the force in the vertical direction is higher by approximately 73%); and for comparison, the force does not increase when the head is inclined at an angle of 45° in the gazette, where the ratio of forces is approximately 1:1, thereby providing no wedging off effects. In other words, such effects are gained that the force in the upward and downward directions is amplified when the head is inclined at a slight angle of 40° or less.

[0070] As shown in FIGS. 4 and 5, the brush head (21) is provided to the head portion (2) having a height y of the protrusion to a side at an angle of 40° or less that is 1/2 (half) or more of the width w (the height y is the length between the end of the brush head (21) and the main body (1) in the perpendicular direction), and therefore, in the present invention, the brush head (21) that inclines laterally naturally makes contact with the roots of the teeth (bordering portions between the teeth and the gums) when brushing teeth in the lateral direction, and thus, it is not necessary to shift the main body (1) upward or downward for brushing, unlike in the prior art where the range of contact is limited to the width w of the brush head (21).

[0071] As a result, the roots of the teeth (bordering portions between the teeth and the gums) are brushed without fail so that food particles are removed from there.

[0072] FIG. 3 shows another embodiment of the present invention where the toothbrush has a brush head that is inclined at approximately the same angle but to the opposite side in the left and right directions to that in FIG. 1 when the main body is positioned in the upward and downward directions as viewed from the front. FIG. 3 is a rear diagram, and thus, the brush head (21) is on the opposite side and is not shown, and the toothbrush is symmetrical to that in FIG. 1.

[0073] It is desirable to use the toothbrush in FIG. 1 and the toothbrush in FIG. 3 as a pair because the portions of the alignment of the teeth with which the brush head with an inclination in the direction of FIG. 1 are complementary to that in FIG. 3 (front and rear of the alignment and the upper and lower portions of the teeth).

[0074] Furthermore, more portions can be brushed with the brush heads (21) when used as a pair, and the angles and the forces vary between the brush heads in FIG. 1 and FIG. 3. In addition, there are important effects where the time for brushing teeth naturally becomes longer.

[0075] As for the colors of the toothbrushes, those in FIG. 1 and FIG. 3 have different colors (red and white, for example) and can be sold in pairs so that the sales can increase for the benefit of the manufacturer or the seller.

[0076] Furthermore, the toothbrush in FIG. 3 may be able to share the main body (1) with the toothbrush in FIG. 1. That is to say, the head portion (2) may be removed from the main body (1) or may be attached to the main body (1) at an inclined angle, and thus, a pair of brush heads (21) inclining in the opposite directions may be prepared so that either can be attached to the main body (1) for use.

[0077] In addition to a pair of brush heads (21) inclining in the opposite directions, a number of brush heads (21) in various shapes may be prepared so that they can be attached to the main body.

[0078] Furthermore, the head portion (2) may bend to the left or right relative to the main body (1), and the bent state may be fixed in accordance with a publicly known method, for example, as a pleated flexible connection or a rotatable connection. Thus, it may not be necessary to prepare a pair of brush heads (21).

[0079] Either in the case where the brush head (21) is removable or the brush head (21) can be fixed in a bent state, the inclination to the left or right is structurally fixed during brushing.

[0080] The effect of the structure, "the length of the brush head is two or more times greater than the width," in a second object of the present invention is described in further detail below.

[0081] The length of the protrusion of the brush head to a side (length K in FIG. 6) can be secured so that the width of the contact with the teeth in the upward and downward directions can be sufficiently secured when the inclined brush head is moved in the left and right directions.

[0082] The brush head can cover the width in the upward and downward directions, that is the width between the lower end of the teeth and the space between the teeth and the gum for the upper teeth and the width between the upper end of the teeth and the space between the teeth and the gum for the lower teeth, and therefore, the brush head can cover the width of the teeth in the upward and downward directions through the contact during one brush stroke.

[0083] This fact, "The brush head can sufficiently cover the width of the teeth in the upward and downward directions through the contact during one brush stroke," is important in the feature of the method for brushing teeth according to the present invention, "Brushing teeth in the left and right direc-
tions in such a manner that the brush head is slightly inclined to a side at an angle of 40° or less.”

[0084] Next, the effect of the structure. “The protrusion of the brush head to a side is limited in such a manner that the smaller cross-section in the portion for connection at a location if extended in the direction towards the brush head overlaps an end of the brush head when projected from the front.”

[0085] In the method for brushing teeth according to the present invention and the toothbrush used for the same;

[0086] a. The length of the brush head is two or more times greater than the width, and therefore, a necessary length of the protrusion of the brush head to a side (length L in FIG. 6) can be secured so that the width of the contact with the teeth in the upward and downward directions can be sufficiently covered with a single brush stroke when the inclined brush head is moved in the left and right directions, and thus, the method for brushing teeth according to the present invention can be put into practice.

[0087] b. Since the length of the brush head is two or more times greater than the width, a large twisting force is applied to the main body as described above when brushing teeth, and in order to mitigate this, the protrusion of the brush head to a side is limited in such a manner that the smaller cross-section in the portion for connection at a location if extended in the direction towards the brush head overlaps an end of the brush head when projected from the front.

[0088] As shown in FIG. 7, the moment of rotation due to the forces (i.e. lateral direction force and counterforce) in the direction perpendicular to the direction in which the brush head moves, such as the force applied to the brush head in the lateral direction due to the wedging effect and the vibrations due to the counterforce from the teeth through the contact with an uneven surface, is set off with the counterforce from the teeth applied to the base of the brush head as long as the entire surface of the brush head makes contact with the teeth. That is to say, the user can brush his or her teeth feeling almost no burden of a twisting force from the main body while brushing.

[0089] The relationship between the moment of rotation of the portion for connection of the main body (1) having a smaller cross-section being 0 and no burden of a twisting force being received from the main body (1) is described in further detail below.

[0090] In the case where the user holds the base of the main body (1) while brushing, the main body is often and naturally pinched between fingers in the direction of the thickness instead of being pinched between fingers in the direction of the width. In this case, the portion away from the above-described portion for connection having a smaller cross-section towards the base almost equals to the center portion or the middle portion of the main body, which is pinched between fingers so that the main body is held. Therefore, when the moment of rotation around the portion for connection having a smaller cross-section of the main body 1 is 0, this basically means that the user does not receive the burden of a twisting force from the main body (1).

[0091] The following secondary effect is also gained from the structure. “The protrusion of the brush head to a side is limited in such a manner that the smaller cross-section in the portion for connection at a location if extended in the direction towards the brush head overlaps an end of the brush head when projected from the front.”

[0092] The above-described structure limits the protrusion of the brush head to a side, and therefore, it is possible to brush teeth without putting something into the mouth that is bulky in the lateral direction.

[0093] This is because, as shown in FIG. 6, the protrusion of the brush head (21) is shorter by the portion where the smaller cross-section in the portion for connection at a location if extended in the direction towards the brush head (21) overlaps an end of the brush head (21) when projected from the front.

[0094] FIG. 9 shows another toothbrush according to the present invention. This toothbrush is different from that in FIGS. 1 and 2 in that it has two brush heads (22) and (23).

[0095] One brush head (22) is fixed to the head portion (2) with the width and the length similar to those in the brush head (21) in FIGS. 1 and 2, and the other narrower brush head (23) is fixed to the brush head more towards the tip than the brush head (22).

[0096] The main working effect of this brush head (23) is to remove the food particles, including bacteria, attached between teeth. That is to say, the brush head (23) goes between the teeth when the user brushes his or her teeth with the toothbrush in the upward and downward directions (can go between the teeth where the spaces are narrow and deep, and the brush head (21) in FIG. 2 or the brush head (22) in FIG. 9 cannot go into these spaces) so that the food particles can be removed.

[0097] In order to confirm the effects of the inclined toothbrush according to the present invention, comparative experiments with a conventional straight toothbrush, which are described below, were carried out in the Department of Oral Surgery of Dentistry in a certain hospital affiliated with a university medical school.

Comparative Experiments

[0098] In brushing tests, brushing was carried out in the lateral direction for two minutes five times per person for five subjects (1 to 5), a conventional toothbrush (straight toothbrush) and an inclined toothbrush (toothbrush according to the present invention) were both used, and a plaque control record was kept.

[0099] First, the subject #1 brushed his or her teeth in the lateral direction for two minutes with the conventional toothbrush, and how much plaque came off was evaluated. This was carried out five times in total for five each day (i.e. one day for one test).

[0100] In the first brushing (one of the five brushings) with the conventional toothbrush, the value of the attachment of plaque before brushing the teeth (degree of plaque on the teeth) was 85, but the value decreased to 56 after brushing.

[0101] Next, in the first brushing on another day (one of the five brushings) with the inclined toothbrush, the value of the attachment of plaque before brushing the teeth (degree of plaque on the teeth) was 43, but the value decreased to 16 after brushing. That is to say, in the first brushing, the degree to which plaque came off with the conventional toothbrush was 34.1% while the degree to which plaque came off with the inclined toothbrush was 62.8%.

[0102] That is to say, in the first experiment, the degree to which plaque came off with the inclined toothbrush was greater.

[0103] The same experiment as in the above was carried out five times for each day on the subject #1, and the average value of these was calculated.
The results were: The degree to which plaque came off with the conventional toothbrush was 51.4% for subject #1, and the degree to which plaque came off with the inclined toothbrush was 63.3%.

That is to say, the degree to which plaque came off with the inclined toothbrush was greater in the average of the five experiments.

The same experiment as the above was carried out on subjects #2 to #5.

The entirety of the experiment data can be summarized as follows:

In the comparison of maximum values, the degree to which plaque came off with the inclined toothbrush was 71% while the degree to which plaque came off with the conventional toothbrush was 57%. Accordingly, the performance of the inclined toothbrush was 1.25 times higher (was higher by 25%) than that of the conventional toothbrush.

In the comparison between the ones having the highest degree of plaque from among the five subjects before brushing their teeth with the conventional toothbrush and with the inclined toothbrush, the degree to which plaque came off with the inclined toothbrush was 71%, and the degree to which plaque came off with the conventional toothbrush was 50%.

Accordingly, the performance of the inclined toothbrush was 1.42 times higher (was higher by 42%) than that of the conventional toothbrush.

The performance of the inclined toothbrush according to the present invention being excellent in the case where the degree of plaque is high before brushing teeth is the most noticeable feature of the method for brushing teeth and the toothbrush according to the present invention.

It should be emphasized that this effect of providing a performance that is higher by 42% could never be achieved by improving detailed portions of the toothbrush, such as adjusting the bristle diameter in the brush head or devising the head of the bristles.

The amount of plaque is often high before brushing children’s teeth, and therefore, it is meaningful for children to use the method for brushing teeth and the toothbrush according to the present invention.

Those were the results of the experiments.

Consideration of the Relationship Between the Comparative Experiments and an Inventive Step of the Present Invention

As can be understood from the above comparative experiments, though the toothbrush in the prior art shown in FIG. 8 is publicly known, the method for brushing teeth in the left and right directions in such a state that the brush head is inclined to a side according to the present invention is not publicly known, and this structure provides the above-described significant effects, and thus, the method according to the present invention has an inventive step.

In addition, the range of inclination, where the brush head is inclined to a side from the main body by a length of 1/2 (half) or more of the width of the head at an angle of 40° or less, relates to an important structure for providing the above-described wedging effect, and this structure is not publicly known in spite of the fact that the toothbrush in the prior art shown in FIG. 8 is publicly known. This structure provides the above-described significant effects, and thus, the method according to the present invention has an inventive step.

The first object of the present invention is achieved by the above-described method according to the present invention and cannot be achieved by the publicly known method for brushing teeth where teeth are brushed in the left and right directions in such a state that the brush head is parallel to the alignment of the teeth with the publicly known toothbrush in the prior art shown in FIG. 8.

In addition, the second object of the present invention can be achieved by the structure of the toothbrush according to the present invention, wherein: a brush head of which the length is two or more times greater than the width is provided at an end of a main body in such a manner that the brush head is inclined to a side from the main body by a length of 1/2 (half) or more of the width of the head at an angle of 40° or less; the main body has a portion for connection to the brush head that is not inclined relative to the main body and has a cross-section smaller than that of the main body; and the protrusion of the brush head to a side is limited in such a manner that said smaller cross-section in the portion for connection at a location if extended in the direction towards the brush head overlaps an end of the brush head when projected from the front.

The second object of the present invention is to satisfy the following two requirements a and b at the same time.

a. The protrusion of the brush head to a side due to the inclination of the brush head secures sufficient contact with the teeth covering from the top to the bottom.

b. The user can brush their teeth, feeling almost no burden of a twisting force received from the main body due to the inclination of the brush head.

In order to achieve the second object of the present invention, in the toothbrush according to the present invention, the two structural components: a brush head of which the length is two or more times greater than the width; and the brush head being provided at an end of a main body in such a manner that the protrusion of the brush head to a side is limited in such a manner that the smaller cross-section in the portion for connection at a location if extended in the direction towards the brush head overlaps an end of the brush head when projected from the front, are combined. This combination is not publicly known, though the toothbrush of which the brush head is inclined is publicly known, and this combination achieves the above-described significant effect, and thus, the toothbrush according to the present invention has an inventive step.

While the invention has been shown and described in detail, the foregoing description is in all aspects illustrative and not restrictive. It is therefore understood that numerous other modifications and variations can be devised without departing from the scope of the invention.

What is claimed is:

1. A method for brushing teeth in the left and right directions with a toothbrush, where a brush head is provided at an end of a main body in such a manner that the brush head is inclined to a side from the main body by a length of 1/2 (half) or more of the width of the head at an angle of 40° or less, in such a state that the inclination of the brush head to a side is fixed during brushing.

2. A method for brushing teeth in the left and right directions with a toothbrush, where a brush head of which the length is two or more times greater than the width is provided at an end of a main body in such a manner that the brush head is inclined to a side from the main body by a length of 1/2 (half)
or more of the width of the head at an angle of 40° or less, in such a state that the inclination of the brush head to a side is fixed during brushing.

3. A method for brushing teeth in the left and right directions with a toothbrush, wherein: a brush head of which the length is two or more times greater than the width is provided at an end of a main body in such a manner that the brush head is inclined to a side from the main body by a length of \( \frac{1}{2} \) (half) or more of the width of the head at an angle of 40° or less; the main body has a portion for connection to the brush head that is not inclined relative to the main body; and the protrusion of the brush head to a side is limited in such a manner that said smaller cross-section in the portion for connection at a location if extended in the direction towards the brush head overlaps an end of the brush head when projected from the front, in such a state that the inclination of the brush head to a side is fixed during brushing.

4. A toothbrush, wherein: a brush head of which the length is two or more times greater than the width is provided at an end of a main body in such a manner that the brush head is inclined to a side from the main body by a length of \( \frac{1}{2} \) (half) or more of the width of the head at an angle of 40° or less; the main body has a portion for connection to the brush head that is not inclined relative to the main body; and the inclination of the brush head to the left or to the right is fixed during brushing.

5. A pair of toothbrushes, consisting of a first toothbrush wherein: a brush head of which the length is two or more times greater than the width is provided at an end of a main body in such a manner that the brush head is inclined to a side from the main body by a length of \( \frac{1}{2} \) (half) or more of the width of the head at an angle of 40° or less; the main body has a portion for connection to the brush head that is not inclined relative to the main body; and the inclination of the brush head to the left or to the right is fixed during brushing, and a second toothbrush having a brush head that is inclined at approximately the same angle on the opposite side to the left or to the right as in the first toothbrush when the brush head is facing the front and the main body is placed vertically.

6. A toothbrush, wherein: a brush head of which the length is two or more times greater than the width is provided at an end of a main body in such a manner that the brush head is inclined to a side from the main body by a length of \( \frac{1}{2} \) (half) or more of the width of the head at an angle of 40° or less; the main body has a portion for connection to the brush head that is not inclined relative to the main body; and the inclination of the brush head to the left or to the right is fixed during brushing.

7. A toothbrush, wherein: a brush head of which the length is two or more times greater than the width is provided at an end of a main body in such a manner that the brush head is inclined to a side from the main body by a length of \( \frac{1}{2} \) (half) or more of the width of the head at an angle of 40° or less; the main body has a portion for connection to the brush head that is not inclined relative to the main body; and the inclination of the brush head to the right or to the left is fixed during brushing.

8. A toothbrush, wherein: a brush head of which the length is two or more times greater than the width is provided at an end of a main body in such a manner that the brush head is inclined to a side from the main body by a length of \( \frac{1}{2} \) (half) or more of the width of the head at an angle of 40° or less; the main body has a portion for connection to the brush head that is not inclined relative to the main body; and the inclination of the brush head to the right or to the left is fixed during brushing.