

SCIENTIFIC STUDIES

Comparative evaluation of the soft tissue response and aesthetics to titanium implants with Zirconia collar and to titanium implants with titanium collar - An In-Vivo Study.



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zirconia, titanium, soft tissue response, gingival index score, plaque index, MSB index, probing depth, aesthetics



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The present clinical trial was carried out in the Department of Prosthodontics, Crown and Bridge, Maulana Azad Institute of Dental Sciences, New Delhi, to evaluate the soft tissue response and aesthetics to titanium implants with zirconia collar and to titanium collar.

The sample comprised of 10 subjects of either sex belonging to the age group of 18-55 years. The subjects with two teeth missing within the same arch were included in the study. The patients selected for the present study were examined clinically and radiographically.

In the study a total of 20 two-piece, one-stage implants, i.e. 10 titanium implants with zirconia collar (Periosave, Z1 Conic, TBR Implants Group, France) and 10 titanium implants with titanium collar (Osstem, SSII) were placed. Both types of implants were placed in the same patient and at the same point of time to remove the subjective bias.

The following indices were carried out to analyse the soft tissue response:

1. Gingival index (Loe H and Silness J, 1963)
2. Plaque index (Sillness P and Loe H, 1964)
3. Modified Sulcular Bleeding index (Mombelli A, 1987)
4. Probing Depth

The soft tissue indices were carried out at the following intervals:

- 6 weeks after implant placement.
- 3 months after implant placement.
- 1 month after prosthetic loading.
- 3 months after prosthetic loading.

The aesthetic evaluation was done using the Visual Analog Scale (VAS) 3 months after prosthetic loading.
Clinical Observation

Twenty implants were placed in ten subjects. All the implants osseointegrated successfully and no implant failed during the course of the study. Soft tissue healing was found to be satisfactory around all the inserted implants.

Statistical Analysis

Descriptive statistics including mean value and standard deviation were used to compare the gingival index, plaque index, modified sulcular bleeding index, periodontal pocket depth and aesthetics of zirconia and titanium collar implants. All calculations were performed using the SPSS (Version 14) for windows (SPSS Inc., Chicago II, USA).

GINGIVAL INDEX:

Gingival index was measured using the method given by Loe and Silness (1963). The mean values of the gingival index at different intervals of time are arranged in Table 1. The gingival index of the zirconia and titanium collar implants were compared using the INDEPENDENT t-test.

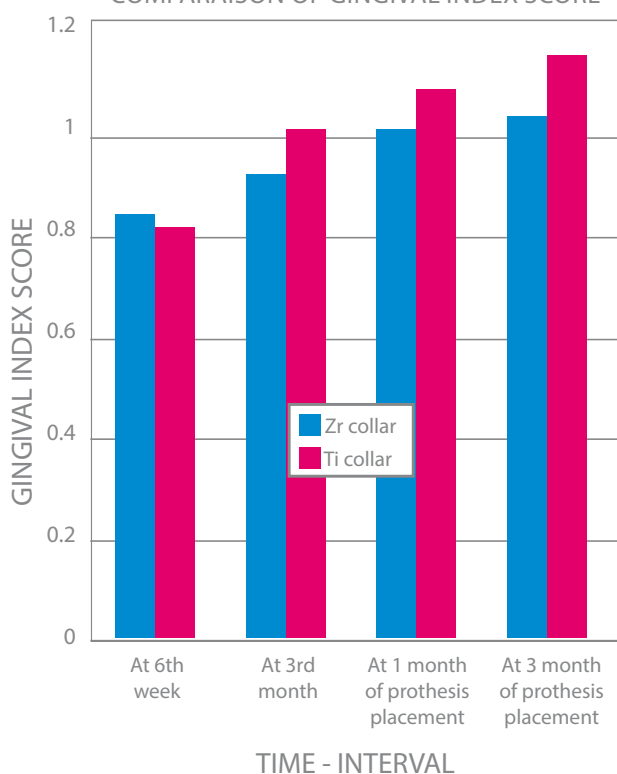
Table 1: Mean comparison of Gingival index

Group	Zr collar implant (N = 10)		Ti collar implant (N = 10)		Sig. (p-value)
	Mean	Std. Deviation	Mean	Std. Deviation	
Gingival index (at 6th week of implant placement)	0.875	0.626	0.85	0.556	0.926
Gingival index (at 3rd month of implant placement)	0.95	0.524	1.05	0.705	0.723
Gingival index (after 1 month of prosthesis)	1.025	0.558	1.1	0.592	0.774
Gingival index (after 3 months of prosthesis)	1.05	0.643	1.175	0.602	0.659

(p-value >0.05=insignificant; p-value <0.05= significant)

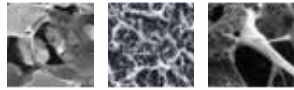
An increase in the gingival index score amongst both groups, however, was found after each follow-up. The values of this score were comparatively higher in the implants with zirconia collar.

COMPARAISON OF GINGIVAL INDEX SCORE



Graph 1: Comparison of Gingival Index Scores between the implants with zirconia collar and the implants with titanium collar





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PLAQUE INDEX:

Plaque index was evaluated using the index given by Sillness P. and Loe H.(1964).The mean values of the plaque index at different intervals of time are arranged in Table 2. The plaque index of the zirconia and titanium collar implants were compared using the INDEPENDENT t-test.

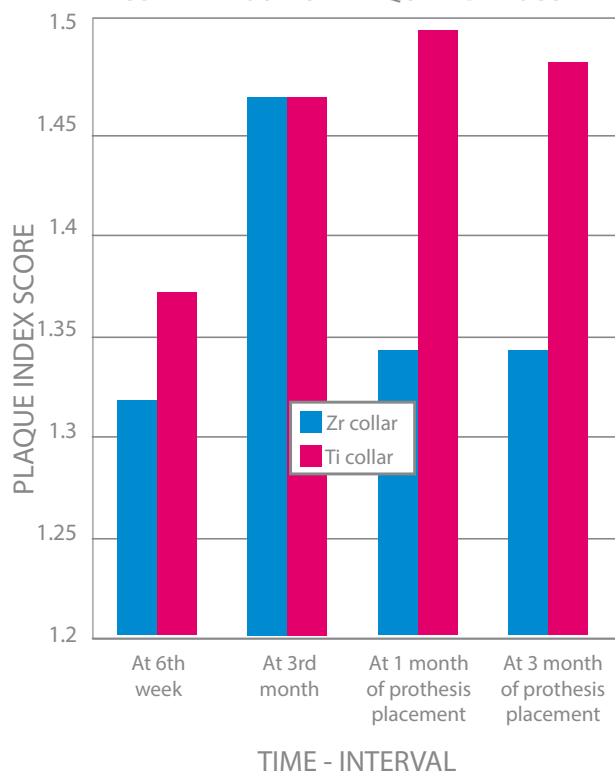
Table 2: Mean comparison of Plaque index

Group	Zr collar implant (N = 10)		Ti collar implant (N = 10)		Sig. (p-value)
	Mean	Std. Deviation	Mean	Std. Deviation	
Gingival index (at 6th week of implant placement)	1.325	0.834	1.375	0.748	0.889
Gingival index (at 3rd month of implant placement)	1.475	0.731	1.475	0.740	1.000
Gingival index (after 1 month of prosthesis)	1.35	0.719	1.5	0.612	0.622
Gingival index (after 3 months of prosthesis)	1.35	0.592	1.475	0.595	0.643

(p-value >0.05=insignificant; p-value <0.05= significant)

During the follow-up appointments, this index was more or less constant in both groups. Amongst each group, the values of this score increased from 6 weeks to 1 month from implant placement but decreased after the placement of the prosthesis and reinforcement of the oral hygiene instructions. The values were higher for the implants with zirconia collar.

COMPARAISON OF PLAQUE INDEX SCORE



Graph 2: Comparison of Plaque Index Scores between the implants with zirconia collar and the implants with titanium collar

MODIFIED SULCULAR BLEEDING INDEX:

This was evaluated using the index given by Mombelli A (1987). The mean values of the modified sulcular bleeding index at different intervals of time are arranged in Table 3. The modified sulcular bleeding indexes of the zirconia and titanium collar implants were compared using the INDEPENDENT t- test.

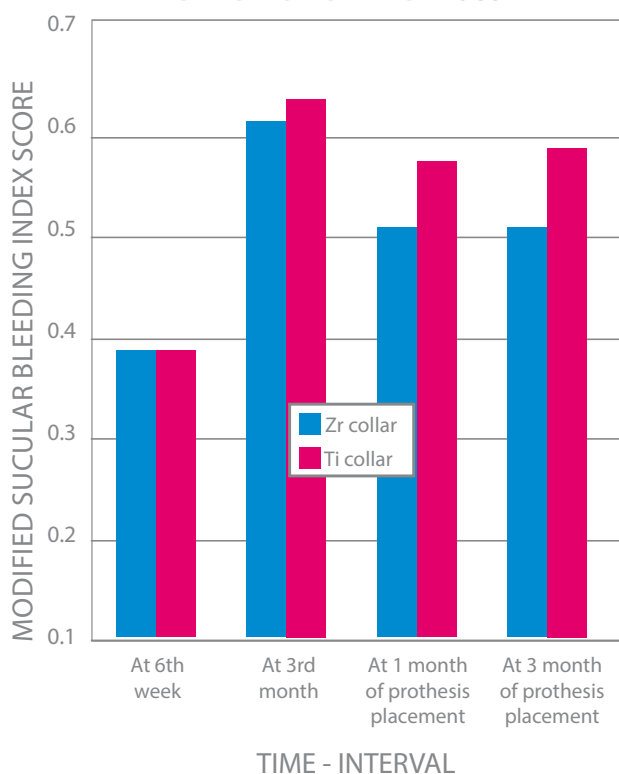
Table 3: Mean comparison of Plaque index

Group	Zr collar implant (N = 10)		Ti collar implant (N = 10)		Sig. (p-value)
	Mean	Std. Deviation	Mean	Std. Deviation	
Gingival index (at 6th week of implant placement)	0.4	0.316	0.4	0.316	1.000
Gingival index (at 3rd month of implant placement)	0.625	0.377	0.65	0.444	0.894
Gingival index (after 1 month of prosthesis)	0.525	0.381	0.575	0.392	0.776
Gingival index (after 3 months of prosthesis)	0.525	0.381	0.6	0.376	0.663

(p-value >0.05=insignificant; p-value <0.05= significant)

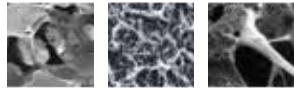
An increase in the modified sulcular bleeding index score was found 3 months from implant placement in both groups and it decreased after prosthesis placement. The mean values of the modified sulcular bleeding scores were higher in the implants with zirconia collar compared to the implants with titanium collar.

COMPARISON OF MODIFIED SULCULAR BLEEDING INDEX INDEX SCORE



Graph 3: Comparison of Modified Sulcular Bleeding Index Scores between the implants with zirconia collar and the implants with titanium collar





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PROBING DEPTH::

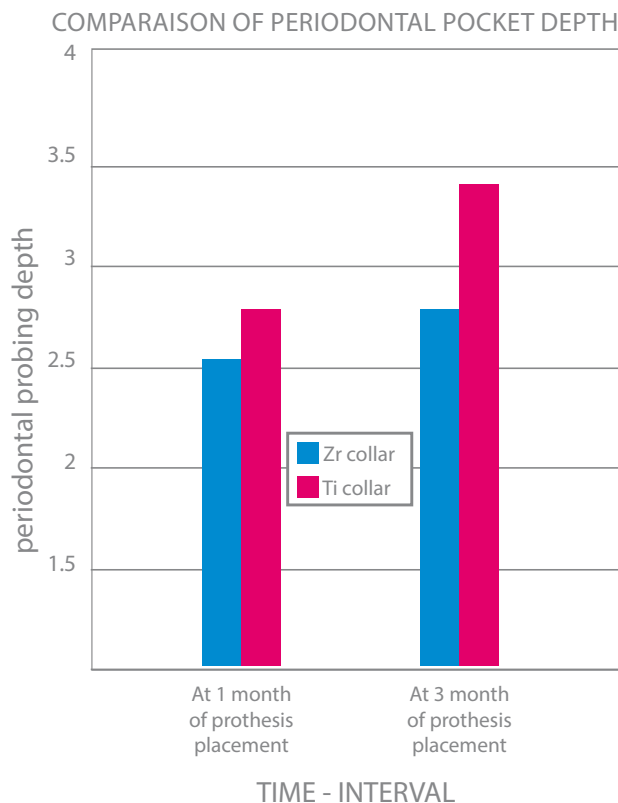
Probing depth around both implants was measured after 1 month and 3 months of prosthesis placement on buccal, lingual, mesial and distal aspect, average value of all the surfaces recorded and compared by using calibrated plastic Periodontal probe (Periowise). The mean and the standard deviation of probing depth for both implants are arranged in Table 4. The comparison of probing depths between the implants was done using INDEPENDENT t- test.

Table 4: Mean comparison of Periodontal pocket depth

Group	Zr collar implant (N = 10)		Ti collar implant (N = 10)		Sig. (p-value)
	Mean	Std. Deviation	Mean	Std. Deviation	
Periodontal pocket depth (after 1 month of prosthesis)	2.675	0.472	2.9	0.412	0.271
Periodontal pocket depth (after 3 months of prosthesis)	2.9	0.293	3.525	0.692	0.017* (significant)

(p-value >0.05=insignificant; p-value <0.05= significant)

There was a significant difference ($p < 0.05$) between the probing depth between the two implants after 3 months from prosthesis placement. The increased probing depths were recorded on the implants with titanium collar compared to the implants with zirconia collar. An increase in the mean probing depth was seen in both groups with time. This increase in the probing depth was more important in the case of implants with titanium collar.



Graph 4: Comparison of Periodontal Probing Depth between the implants with zirconia collar and the implants with titanium collar

COMPARISON OF AESTHETICS::

The mean values of the aesthetic scores were calculated by taking the average of the recordings given both by the trained and the untrained observers together.

The mean values of 'Visual Analogue Scale (VAS)' for both implants are listed in Table 5.

Table 5: Mean comparison of Aesthetics (VAS)

Type of collar	Number	Mean	Std. Deviation	Sig. (p-value)
Zr	10	7.63	0.627	0.009
Ti	10	6.85	0.558	

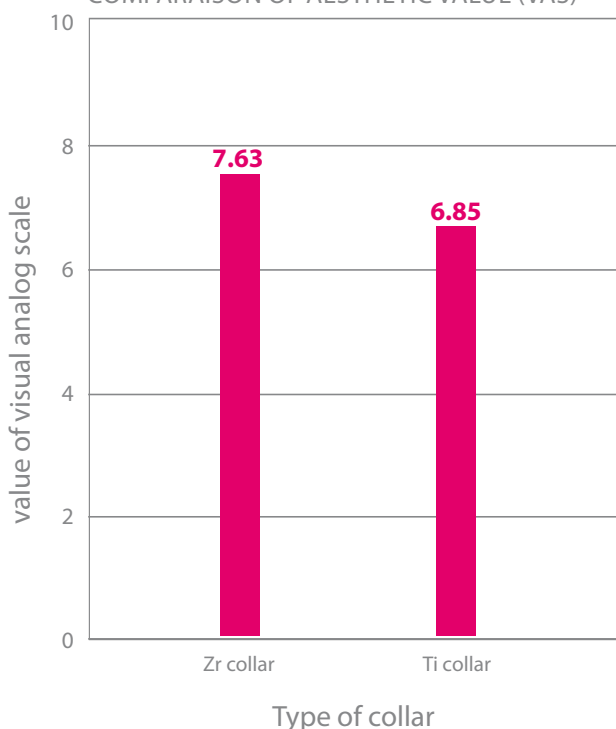
The comparison between the implants was done using INDEPENDENT t-test. (p-value >0.05=insignificant; p-value <0.05= significant)

The difference in comparison of aesthetic scores is significant, (p<0.05) with the average score for zirconia collar being 7.63 which is higher than the titanium collar implants having the average score of 6.85. In most cases the gingival hue of the sites which received the titanium collar implants was greyish whereas the sites which received the zirconia collar implants had a gingival hue much similar to the adjacent natural gingiva. The contour and adaptation of the gingiva on the other hand was also better in the implants with zirconia collar.

CONCLUSION:

According to the tests performed during this comparative study, there is a difference between the titanium implants with zirconia collar and the titanium implants with titanium collar. This difference shows that the zirconia collar behaves as a true antibacterial shield and thereby improves cellular adhesion and cellular proliferation, more than the titanium collar. This study shows in particular that the zirconia collar provides more aesthetic soft tissue support.

COMPARAISON OF AESTHETIC VALUE (VAS)



Graph 5: Comparison of Aesthetic Scores between the implants with zirconia collar and the implants with titanium collar

