Journal Homepage: -www.journalijar.com

INTERNATIONAL JOURNAL OF ADVANCED RESEARCH (IJAR)

Article DOI:10.21474/IJAR01/14211
DOI URL: http://dx.doi.org/10.21474/IJAR01/14211

RESEARCH ARTICLE

A COMPARATIVE EVALUVATION OF HERBST APPLIANCE AND THE ADVAN SYNC 2 IN THE TREATMENT OF CLASS II MALOCCLUSION

Dr. Eric Thomas[1], Dr. Sunil Muddaiah[2], Dr. Goutham B.[3], Dr. Sanju Somaiah[4], Dr. Bk Shetty[5] and Dr. Shoaib Ulla Khan[6]

1. Senior Lecturer, Coorg Institute of Dental Sciences Virajpet, Karnataka.
2. Professor& Dean,Coorg Institute of Dental Sciences Virajpet, Karnataka.
3. Professor &HOD,Coorg Institute of Dental Sciences Virajpet, Karnataka.
4. Professor,Coorg Institute of Dental Sciences Virajpet, Karnataka.
5. Professor, Coorg Institute of Dental Sciences Virajpet, Karnataka.
6. PG Student,Coorg Institute of Dental Sciences Virajpet, Karnataka.

Manuscript Info

Manuscript History
Received: 10 December 2021
Final Accepted: 13 January 2022
Published: February 2022

Key words: -
Class II Malocclusion, Fixed Functional Appliance, Advansync 2, Herbst

Abstract

Background D And Objectives: Treatment of class II malocclusion has been a prime focus of orthodontic investigators for decades. Objectives: To evaluate the effects of Herbst fixed functional appliance in the treatment of class II malocclusion, to evaluate the effects of Advansync 2 fixed functional appliance in the treatment of class II malocclusion, to compare the effects of Herbst and Advansync 2 fixed functional appliances in the treatment of class II malocclusion

Method: The sample size consisted of 14 patients who reported to department of orthodontics and dentofacial orthopedics, Coorg institute of dental sciences, Virajpet seeking fixed orthodontic treatment. The patients were divided into two groups: Group A: 7 patients who were treated with Herbst fixed functional appliance. Group B: 7 patients who were treated with Advansync 2 fixed functional appliance The effects of appliances were measured at two intervals T0 – At the beginning of the treatment T1 - Nine months after appliance delivery

Results: Patients who were treated with the Advansync 2 fixed functional appliances had better C0- GN, C0- GO, and UI A after the nine months of appliance delivery Patients who were treated with the Herbst fixed functional appliances had better SNA, SNB, WITZ, CO-A, ANB, UI- A, LI-B, LI B, UL- EPL, and FMA after the nine months of appliance delivery. INTERPRETATION AND CONCLUSION: Advansync 2 and Herbst appliance was effective in normalizing Class II malocclusions.

Introduction:-

TreatmentofclassIImalocclusionhasbeenaprimefocusoforthodonticinvestigatorsfordecades.ClassIImalocclusionsoccurin23%ofchildrenaged8to11years,15%ofyouthsaged12to17yearsand13%ofadultsaged18to50years,therebymakingit themostprevalentskeletal disharmony encounteredin all age groups.Numeroustreatmentmodalitieshavebeendevelopedtocorrect ClassIImalocclusions.Theseincludeselectiveextract

Corresponding Author:- Dr. Shoaib Ulla Khan
Address:- PG Student,Department of Orthodontics and Dentofacial Orthopedics, Coorg Institute of Dental Sciences,Virajpet, Karnataka.

ionpatterns,orthopedicforcesdeliveredwithheadgear,jawOrthopedicsusingfunctionalappliances,removableandfixedintra-archandinterarchappliancesaswellasorthognathicsurgerytorepositionjaworbothjaws.[4]

ClassIImalocclusionsrepresentadisproportionaterelationshipbetweentheupperandlowerteeth,wherethelowerteetharelocatedfurtherposteriorlythantheuppereitherduetoskeletalfactors,dentalfactors,oracombinationofboth.Thisisacommonmalocclusionthatfrequentlypresentsinorthodonticswithawidearrayoftreatmentoptions.Thelatesttrendintreatingthismalocclusionhasderivedfromnewtechniquesdesignedtomaketreatmentmorepredictable,reducetreatmenttimeandreducetheneedforpatientcooperation.[6]

There are many ways to treat Class II malocclusions which includeremovable and fixed functional appliances, elastics, extractions, headgear, implants, non-implant supported distalizers and even surgery. Suppliers and orthodontists have beencreatingmoreandmorefixedClassIIcorrectingappliancestolimitrelianceonpatientcompliancethat,iflacking,canleadtolongertreatmenttimesandlessthanidealtreatment outcomes.Inmost casestheseappliancescanremovethefearofsurgeryandmaintaintheparent'sdesiretonotseetheirchildrenloseteethduetoClassIIcorrection.There are many different compliance free inter-arch appliances including the Herbst,MandibularAnteriorRepositioningAppliance(MARA),ForsusandAdvanSync.Eachappliancehasitsownadvantagesanddisadvantages.Someallowtreatmentcorrectionatanearlierage;othersallowconcurrenttreatmentwithcomprehensivefixedtherapy.Therealsomaybesomesideeffectsfromtheseappliancesmostnotablylower incisorflaring.Fromthose listedappliances,thetwonewestaretheForsusandAdvanSync,whichbothallowconcurrenttreatment,and botharethoughttohavesimilarsideeffects.[12]

Fixedorremovablefunctionalappliancesaredesignedtoalterthepositionofthejawsbothsagittallyandvertically,resultinginorthopedicandorthodonticchanges.Althoughtheeffectsofsomefixedfunctionalappliancessuchastheherbstandthemandibularanteriorrepositioningappliance(MARA)havebeenwelldocumentedintheliterature,theeffectsoftheAdvanSyncappliance(Ormco,Glendora, Calif) arenotwell understood. This fixed functional appliance consists of crowns cemented to themaxillary and mandibular permanent first molars, which are connected by telescopingrods. The AdvanSync was designed to allow for simultaneous use of conventionaledgewise appliances since the crowns have 0.022 X 0.028 in slots. The telescopingmechanismactstoconstantlyposturethemandibleforwarduponclosure,withthegoalofenhancingmandibulargrowthtocorrecttheClassIImalocclusion.

Many of the earlier methods for treatment of Class II patients typicallyinvolvedremovablecompliance-basedmodalitiessuchasremovablefunctionalappliancesandintermaxillaryClassIIelastics.Overtime, lackofpatientcomplianceandthedesiretoproducemorepredictableresultsinamoreefficientmannerledtothedevelopmentofnumerousfixedappliances,whichdidnotrequirepatientcomplianceforefficacy.Thereare advantages and disadvantages for each type of appliance and the orthodontist mustchoosethemostappropriatemodalityforeachindividualpatient.[14]

Withtheconstantarrivalofnewtechniquesandappliances,orthodontists are now equipped with more options than ever before but have theresponsibility to base their treatment decisions on sound evidence. It is crucial fororthodonticappliancestobethoroughlyinvestigatedtofullyunderstandtheirtrueeffects. Appliances designed to correct Class II malocclusions provide their effectsthrough a combination of skeletal and dentoalveolar changes (McSherry et al., 2000).Understandingthespecificskeletalanddentaleffectsofeachappliance isvitaltoproperappliance selectionbasedonindividualpatientrequirements

AdvanSync™ isafixedappliancedevelopedbyOrmco™totreatClassIImalocclusions.Theapplianceconsistsofcrownscementedtopermanentupperandlowerfirstmolarswhichareconnectedbytelescopingrods.TheAdvanSync™ wasdesignedtoallowforsimultaneousfixedorthodonticappliancetreatment,asthecrownsareequippedwith 0.022" x 0.028" slots; this has been claimed to reduce overall treatment times.AdvanSync™ ismeanttoposturethemandibleforward,andthereforecanbeclassifiedas a fixed functional appliance. According to Ormco™, Advansync™ produces stableorthopedicchangebyskeletaladvancementofthemandible,whileeliminatingtheneedforpatientcompliance.[22]

Therefore, the purpose of this study was to evaluatethe skeletal, dentoalveolar and soft tissue effects of the AdvanSync appliance and Herbstappliance in the correction of Class II malocclusions in growing patients and tocomparetheeffectsofHerbstandAdvanSyncfixedfunctionalappliances.

AimsandObjectives:-

Thepresentstudywasconductedwiththefollowingaimsandobjectives.

1. Toevaluatetheeffects ofHerbstfixedfunctionalappliancethetreatmentofclassIImalocclusion
2. ToevaluatetheeffectsofAdvanSyncfixedfunctionalappliancethetreatmentofclass IImalocclusion
3. TocomparetheeffectsofHerbstandAdvanSyncfixedfunctionalappliancesthetreatmentofclass IImalocclusion

Methods And Methodology:-

The sample size consisted of 14patientswhoreported to the department of orthodontics and dentofacial orthopedics, seeking fixedorthodontictreatment.

Procedure:

The patients were divided into twogroups:

1. Group A: 7 patients who were treated with Herbst fixed functional appliance
2. Group B: 7 patients who were treated with Advansync2 fixedfunctionalappliance

Pre-treatment and post functional lateral cephalograms were taken. All the digitalradiographsweretakenusingSIRONA(ORTHOPHOSXG5)withthesameoperator. To standardize the radiographs, all magnifications were corrected to 0%. Oneinvestigatordrewallthetracingsandmeasurements.Inboththegroupsfixedorthodontic treatment was started only at the end of fixed functional phase. Followingthe active phase of the treatment the fixedfunctional appliance wasremovedonlyafter a minimum of three-month retention period.

The effects of appliances weremeasuredattwointervals

1. T_0– At the beginning of the treatment
2. T_1 - Nine months after appliance delivery

The data was collected, coded, and fed in SPSS (IBM Version 23) for statistical analysis. The descriptive statistics included mean &standard deviation. Inferential statistics included paired tTest&Independent t Test for the comparison. The levelofsignificance wassetat 0.05 at 95% confidence interval.

Results:-

The descriptive statistics done using SPSS (IBM SPSS Statistics for Windows, Version22.0, Armonk, NY: IBM Corp. Released 2013) included mean & standard deviation. The inferential statistics included independent t test, and paired t test. Independent t test was used to compare the mean of two unrelated independent groups. Paired t test was used to compare the difference between two sets of values of a parameter from the same subjects. The level of significance was set at 0.05 at 95% Confidence Interval.

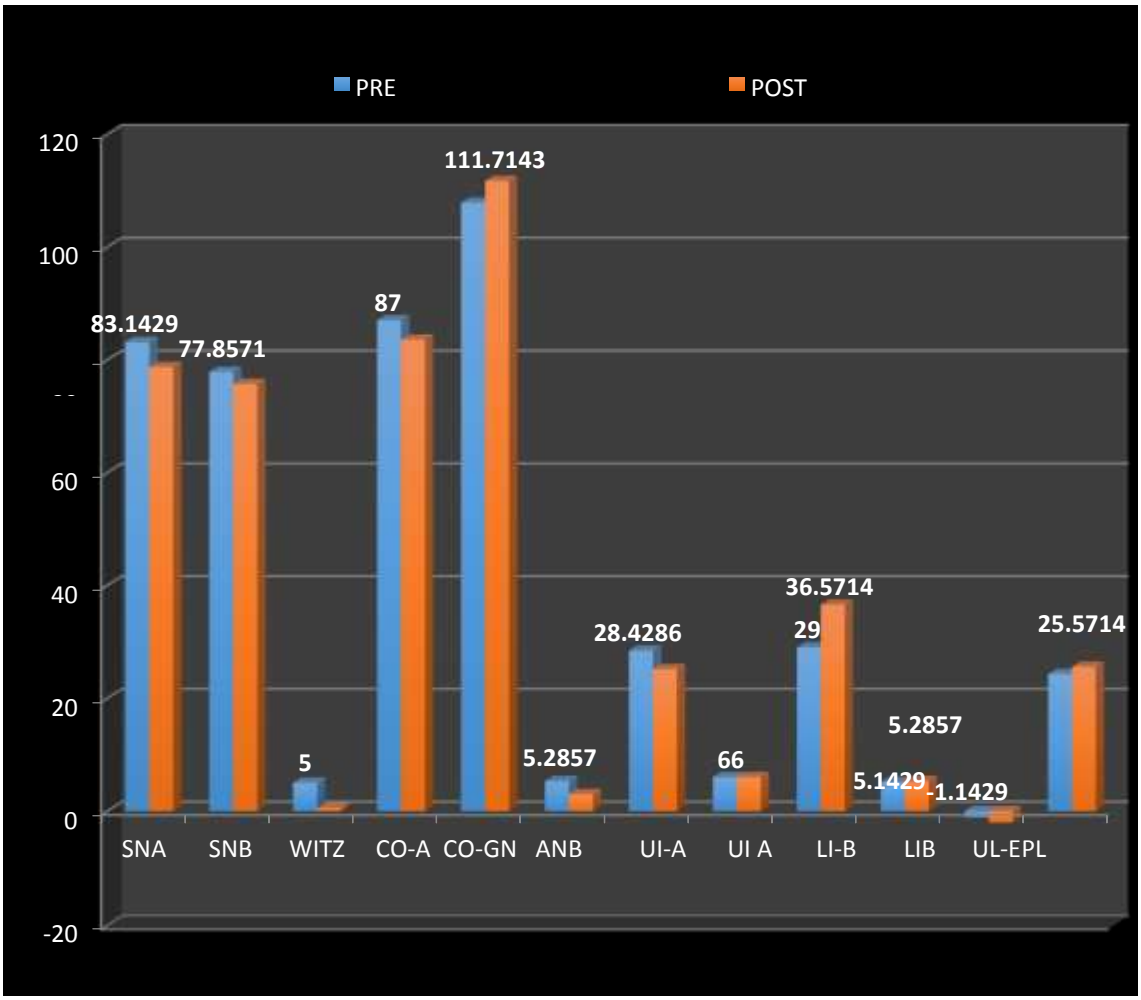
Advansync2 Fixed Functional Appliance:

In the patients treated with Advansync2 fixed functional appliances, the mean of the cephalometric readings before and after the treatment were recorded (Table 1& Graph 1).

ADVSYNC		MEAN	Standard. Deviation	MEDIAN	Z	SIG.
SNA	PRE	83.1429	5.72796	80	-2.043	**0.041(S)**
	POST	78.7143	6.57557	81		
SNB	PRE	77.8571	4.8107	77	-1.364	0.172(N.S)
	POST	75.7143	6.1837	76		
WITZ	PRE	5	1.82574	4	-2.388	**0.017(S)**
	POST	0.5714	1.61835	1		
CO-A	PRE	87	2.70801	86	-2.388	**0.017(S)**
	POST	83.5714	4.23703	82		
C0-GN	PRE	107.857	4.09994	107	-2.388	**0.017(S)**
	POST	111.714	2.9277	111		
C0-GO	PRE	61.2857	6.77531	62	-1.342	0.180(N.S)
	POST	70.5714	17.98941	65		

ANB	PRE	5.2857	2.05866	5	-2.414	**0.016(S)**
	POST	3	1.1547	3		
UI-A	PRE	28.4286	7.61265	27	-1.703	0.089(N.S)
	POST	25.1429	7.53721	22		
UIA	PRE	6	3.41565	5	0	1.000(N.S)
	POST	6	3.41565	5		
LI-B	PRE	29	6.90411	25	-2.388	**0.017(S)**
	POST	36.5714	5.8838	32		
LIB	PRE	5.1429	2.67261	5	-1	0.317(N.S)
	POST	5.2857	2.62769	5		
UL-EPL	PRE	-1.1429	2.54484	-1	-1.656	0.098(N.S)
	POST	-2	3.26599	-1		
FMA	PRE	24.2857	5.12231	24	-0.68	0.496(N.S)
	POST	25.5714	2.37045	25		

Table1:- ComparisonofeffectsofAdvansync2fixedfunctionalappliancesduring the beginningofthetreatmentandninemonthsafterappliance delivery.



Graph1:- ComparisonofeffectsofAdvansync2fixedfunctionalappliancesduringthebeginningofthetreatmentandninemonthsafterappliancedelivery.

The C0-GN, C0-GO, LI - B (angular), LI - B (linear) and FMA values were found to have improved after nine months of theAdvansync2 fixed functionalappliance delivery. On the contrary SNA, SNB, WITZ, CO - A,

ANB, UI – A and UL - EPL values were reduced after nine months of theAdvansync2 fixed functionalappliance delivery. UI - A showed no difference in their mean valuesfrom the beginning of the treatment and nine months after appliance delivery.

P-values were observed to be less than 0.5 for parameters such as SNA, WITZ, CO - A, C0 - GN, ANB and LI - B. Hence, we rejected the null hypothesis and accepted the alternate hypothesis for these parameters. Therefore, for these values the differences from the beginning of the treatment and nine months after appliance delivery were observed to be statistically significant.

P-value for SNB, C0 - GO, UI - A, UI - A, LI - B, UL - EPL and FMA was however observed to be greater than 0.5. Hence, we failed to reject the null hypothesis for these parameters. Therefore, for these values the differences from the beginning of the treatment and nine months after appliance delivery were observed to be statistically insignificant.

Herbst Fixed Functional Appliance:

In the patients treated with Herbst fixed functional appliances, the mean of the cephalometric readings before and after the treatment were recorded (Table 2 & Graph 2).

HERBST		MEAN	STANDARDDEVIATION	MEDIAN	Z	SIG.
SNA	PRE	83.5714	5.68205	84	-2.06	**0.039(S)**
	POST	81.5714	4.89412	81		
SNB	PRE	78	5.06623	79	-0.135	0.892(N.S)
	POST	78.2857	5.18698	80		
WITZ	PRE	4.8571	2.1157	5	-2.414	**0.016(S)**
	POST	1	1.63299	1		
CO-A	PRE	85.2857	1.97605	85	-0.17	0.865(N.S)
	POST	85	3.41565	86		
C0-GN	PRE	105.714	3.09377	106	-2.032	**0.042(S)**
	POST	108.857	4.84522	111		
C0-GO	PRE	57.8571	7.75518	60	0	1.000(N.S)
	POST	57.8571	7.75518	60		
ANB	PRE	5.5714	1.81265	5	-2.456	**0.014(S)**
	POST	3.2857	2.81154	3		
UI-A	PRE	26.2857	7.73982	23	-2.56	0.798(N.S)
	POST	27.2857	6.07493	26		
UIA	PRE	5.6429	3.0099	5	0	1.000(N.S)
	POST	5.6429	3.0099	5		
LI-B	PRE	31.4286	5.38074	32	-2.379	**0.017(S)**
	POST	37.8571	4.67007	39		
LIB	PRE	6.4286	2.1492	5	-0.577	0.564(N.S)
	POST	6.2857	1.60357	5		
UL-EPL	PRE	0.1429	1.21499	1	-0.447	0.655(N.S)
	POST	0	1.52753	1		

FMA	PRE	26	7.72442	27	-0.137	0.891(N.S)
	POST	26.4286	7.69972	28		

Table2:-ComparisonofeffectsofHerbstfixedfunctionalappliancesduringthebeginningofthe treatmentandninemonthsafterappliancedelivery.

SNB, C0 - GN, UI - A, LI – B and FMA was found to have increased after nine months of theHerbst fixed functional appliance delivery. On the contrary SNA, WITZ, CO - A, ANB, LI - B and UL - EPL were decreased after nine months of theHerbst fixed functional appliance delivery. C0 - GO and UI - A had no difference in their mean valuesfrom the beginning of the treatment and nine months after appliance delivery.

P-values was observed to be less than 0.5 for parameters such as SNA, WITZ, C0-GN, ANB, and LI-B. Hence, we rejected the null hypothesis and accepted the alternate hypothesis for these parameters. Therefore, for these values the differences from the beginning of the treatment and nine months after appliance delivery were observed to be statistically significant.

P-value for SNB, CO - A, C0 - GO, UI - A, UI - A, LI - B, UL - EPL and FMA was however observed to be greater than 0.5. Hence, we failed to reject the null hypothesis for these parameters. Therefore, for these values the differences from the beginning of the treatment and nine months after appliance delivery were observed to be statistically insignificant.

Comparison between Advansync2 and Herbst Fixed Functional appliance:
When readings at the beginning of the treatment were compared between patients who were treated with theAdvanSync fixed functional appliances and Herbst fixed functional appliance (Table 3A,3B,3C& Graph 3A,3B), patients who underwent treatment with theAdvanSync fixed functional appliances showed better readings of WITZ, CO - A, C0 - GN, C0 – GO and UI – A (angular, linear)and patients who underwent treatment with theHerbst fixed functional appliances showed better readings of SNA, SNB, ANB, LI – B (angular, linear) and UL-EPL.

		MEAN	STANDARDDEVIATION	MEDIAN	MANNWHITNEYU	Z	SIG.
SNAPRE	ADVSYNC	83.1429	5.72796	80	24.5	0	1.000(N.S)
	HERBST	83.5714	5.68205	84			
SNAPOST	ADVSYNC	78.7143	6.57557	81	21.5	-0.385	0.701(N.S)
	HERBST	81.5714	4.89412	81			
SNBPRE	ADVSYNC	77.8571	4.8107	77	22.5	-0.259	0.796(N.S)
	HERBST	78	5.06623	79			
SNBPOST	ADVSYNC	75.7143	6.1837	76	18	-0.836	0.403(N.S)
	HERBST	78.2857	5.18698	80			
WITZPRE	ADVSYNC	5	1.82574	4	24	-0.065	0.948(N.S)
	HERBST	4.5871	2.1157	5			
WITZPOST	ADVSYNC	0.5714	1.61835	1	21	-0.471	0.638(N.S)
	HERBST	1	1.63299	1			

CO-APRE	ADV SYNC	87	2.70801	86	15	-1.247	0.212(N.S)
	HERBST	85.2857	1.97605	85			
CO-APOST	ADV SYNC	83.5714	4.23703	82	20.5	-0.52	0.603(N.S)
	HERBST	85	3.41565	86			

Table 3A:- Comparison of effects of Advansync2 fixed functional appliancesandHerbst fixed functional appliances during the beginning of the treatment andnine months afterappliancedelivery.

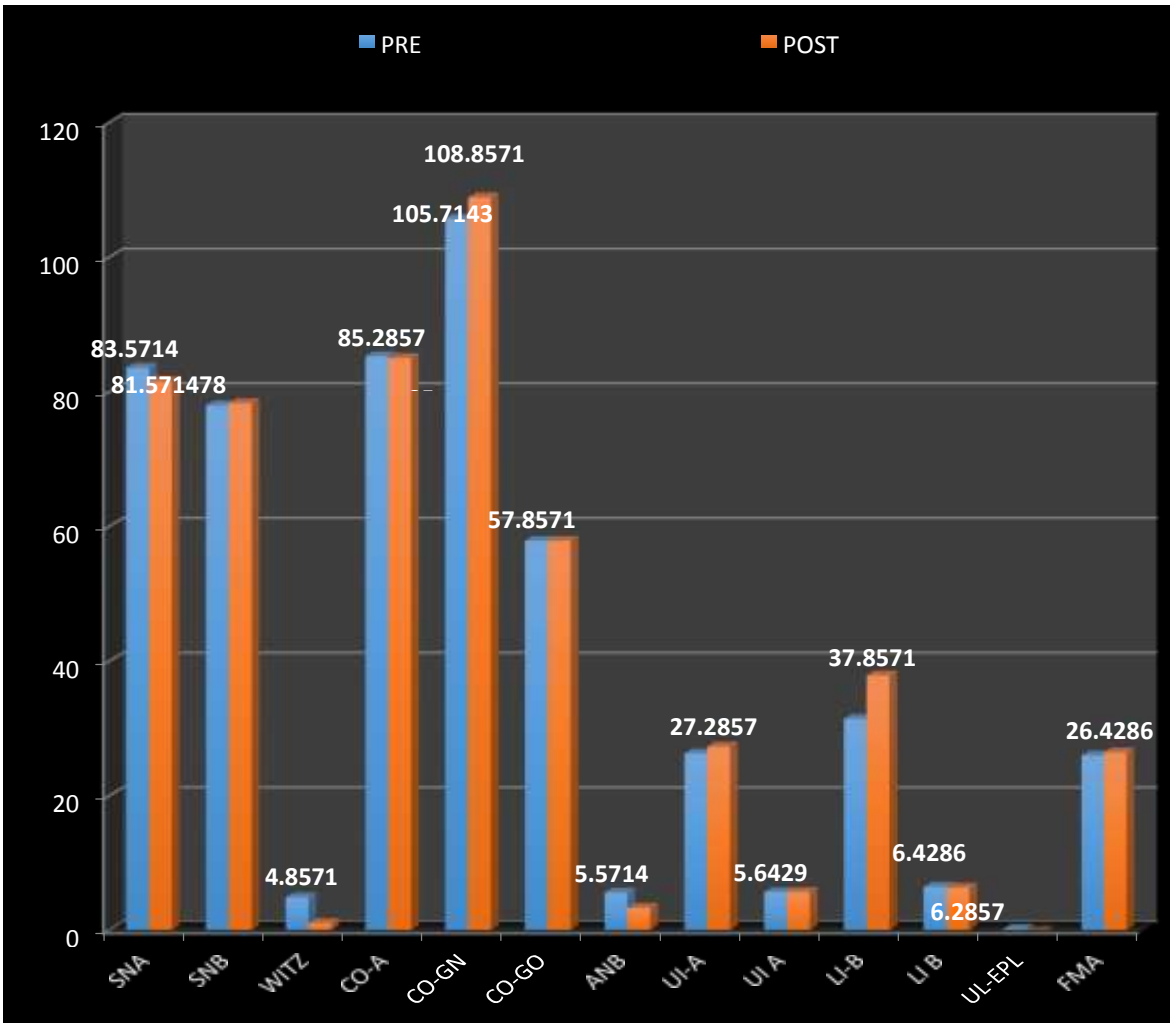
		MEAN	STANDARDDEVIATION	MEDIAN	MANNWHITNEYU	Z	SIG.
CO-GNPRE	ADVSYNC	107.857	4.09994	107	18.5	-0.775	0.438(N.S)
	HERBST	105.714	3.09377	106			
CO-GNPOST	ADVSYNC	111.714	2.9277	111	23.5	-0.132	0.895(N.S)
	HERBST	108.857	4.84522	111			
CO-GOPRE	ADVSYNC	61.2857	6.77531	62	15.5	-1.167	0.243(N.S)
	HERBST	57.8571	7.75518	60			
CO-GOPOST	ADVSYNC	70.5714	17.98941	65	9	-1.996	**0.046(S)**
	HERBST	57.8571	7.75518	60			
ANBPRE	ADVSYNC	5.2857	2.05866	5	22	-0.327	0.744(N.S)
	HERBST	5.5714	1.81265	5			
ANBPOST	ADVSYNC	3	1.1547	3	19	-0.72	0.471(N.S)
	HERBST	3.2857	2.81154	3			
UI-APRE	ADVSYNC	28.4286	7.61265	27	20	-0.585	0.558(N.S)
	HERBST	26.2857	7.73982	23			
UI-APOST	ADVSYNC	25.1429	7.53721	22	18.5	-0.773	0.439(N.S)
	HERBST	27.2857	6.07493	26			

Table3B:-ComparisonofeffectsofAdvansync2fixedfunctionalappliancesand Herbst fixed functional appliances during the beginning of thetreatmentand nine months afterappliance delivery.

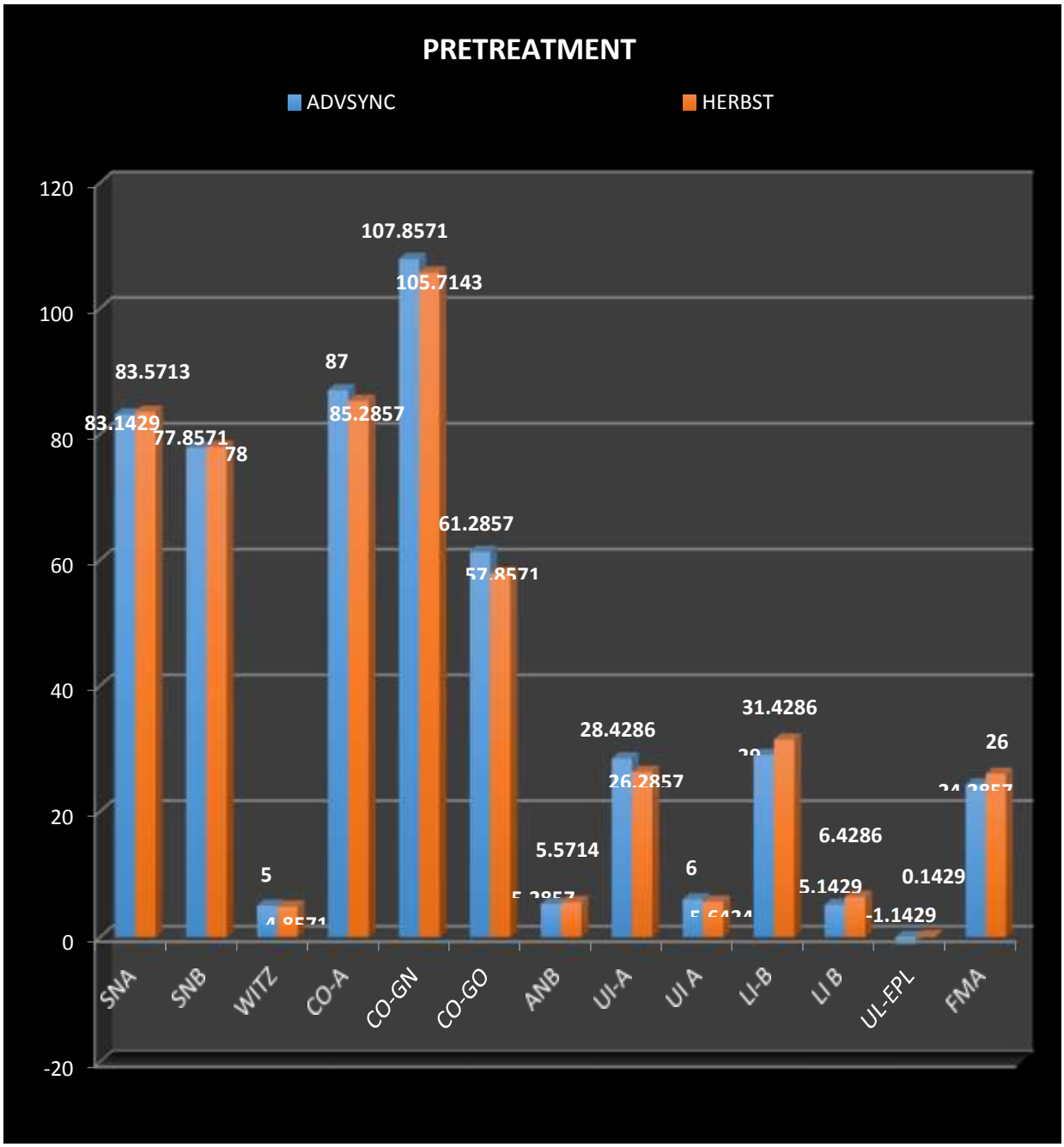
		MEAN	STANDARDDEVIATION	MEDIAN	MANNWHITNEYU	Z	SIG.
UI APRE	ADV SYNC	6	3.41565	5	23	-0.1	0.844(N.S)
	HERBST	5.64	3.0099	5			

		29				97	
UIAPOST	ADV SYNC	6	3.41565	5	23	-0.197	0.844(N.S)
	HERBST	5.6429	3.0099	5			
LI-BPRE	ADV SYNC	29	6.90411	25	18	-0.847	0.397(N.S)
	HERBST	31.4286	5.38074	32			
LI-BPOST	ADV SYNC	36.5714	5.8838	32	21.5	-0.401	0.688(N.S)
	HERBST	37.8571	4.667007	39			
LI BPRE	ADV SYNC	5.1429	2.67261	5	16.5	-1.056	0.291(N.S)
	HERBST	6.4286	2.1492	5			
LIBPOST	ADV SYNC	5.2857	2.62769	5	18.5	-0.829	0.407(N.S)
	HERBST	6.2857	1.60357	5			
UL-EPLPRE	ADV SYNC	-1.1429	2.54484	-1	17.5	-0.961	0.336(N.S)
	HERBST	0.1429	1.12499	1			
ULEPLPOST	ADV SYNC	-2	2.26599	-1	14.5	-1.355	0.182(N.S)
	HERBST	0	1.52753	1			
FMAPRE	ADV SYNC	24.2857	5.12231	24	21.5	-0.394	0.693(N.S)
	HERBST	26	7.72442	27			
FMAPOST	ADV SYNC	25.5712	2.37045	25	21	-0.449	0.653(N.S)
	HERBST	26.4286	7.69972	28			

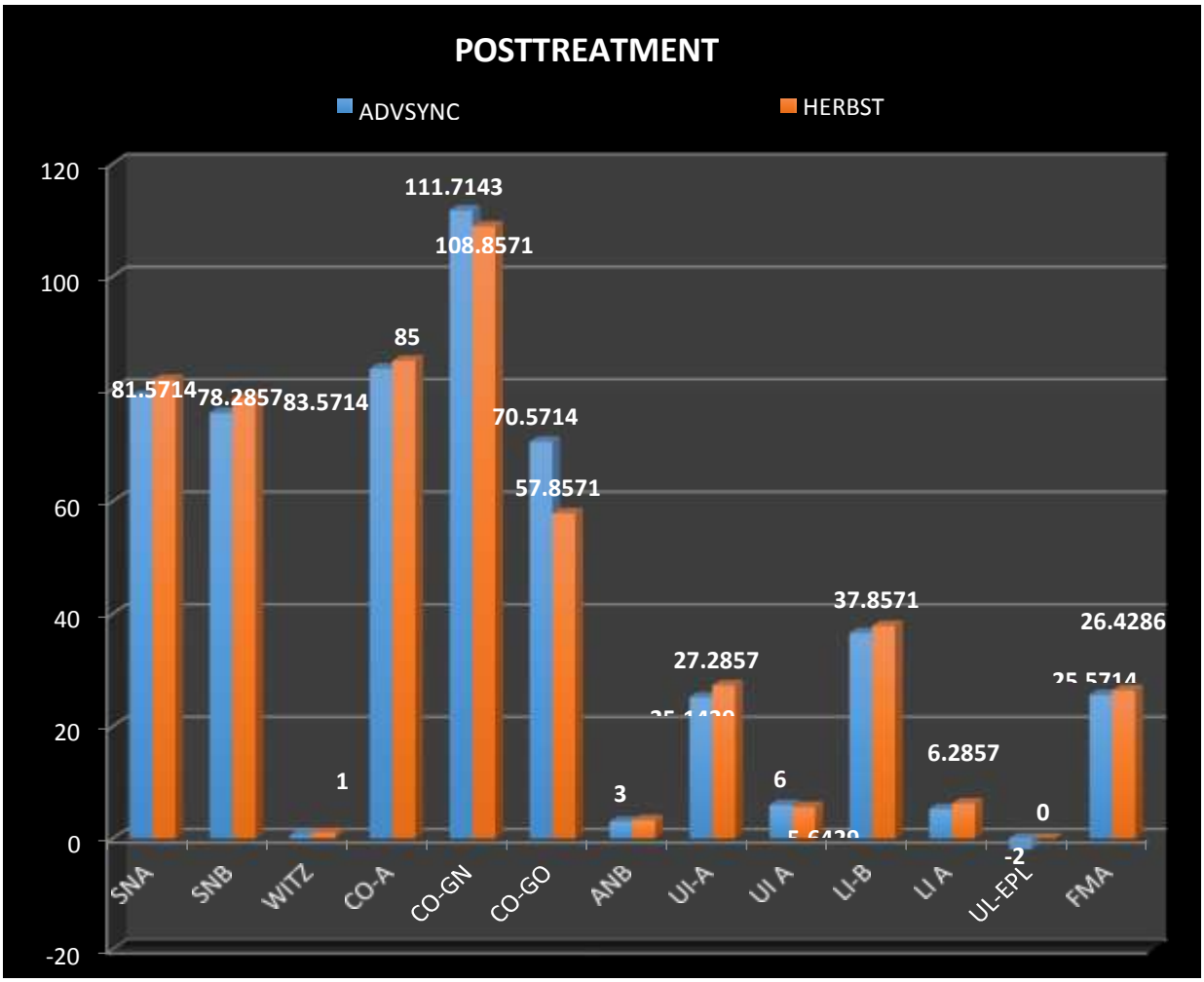
Table3C:-ComparisonofeffectsofAdvansync2fixedfunctionalappliancesand Herbst fixed functional appliances during the beginning of thetreatmentand nine months afterappliance delivery.



Graph2:-ComparisonofeffectsofHerbstfixedfunctionalappliancesduringthebeginningofthe treatmentandninemonthsafterappliancedelivery.



Graph 3A:- Comparison of effects of Advansync2 fixed functional appliancesandHerbst fixed functional appliancesduring the beginning of the treatment andnine months afterappliancedelivery.



Graph3B:-ComparisonofeffectsofAdvansync2fixedfunctionalappliancesand Herbst fixed functional appliances during the beginning of thetreatmentand nine months afterappliance delivery.

At the beginning of the treatment, when P-values of the patients who underwent treatment with theAdvansync2 fixed functional appliances and Herbst fixed functional appliances were compared for all the observed factors, P-value was observed to be greater than 0.05 for all the observed factors. Hence, we failed to reject the null hypothesis. Therefore, the difference at the beginning of treatment between these appliances was observed to be statistically insignificant.

After the nine months of appliance delivery, when P-values of the patients who underwent treatment with theAdvansync2 fixed functional appliances and Herbst fixed functional appliances were compared, patients who underwent treatment with theAdvansync2 fixed functional appliances had better readings of C0 - GN, C0 - GO and UI – A and patients underwent treatment with the Herbst fixed functional appliances had better readings of SNA, SNB, WITZ, CO - A, ANB, UI - A, LI – B (angular, linear), UL - EPL and FMA.

After the nine months of appliance delivery, when P-values of the patients who underwent treatment with theAdvansync2 fixed functional appliances and Herbst fixed functional appliances were compared for all the observed factors, P-value was observed to be greater than 0.05 for all the observed factors except C0 - GO. Hence, we failed to reject the null hypothesis for all the observed factors except C0-GO. Therefore, the difference after nine months of appliance delivery between these appliances was observed to be statistically insignificant except CO- GO which was statistically Significant.

Discussion:-

This was a retrospective cephalometric study looking at the dental, skeletal,and soft tissue treatment impacts of the AdvanSync2appliance and Herbst appliance inthe treatment of skeletal Class II malocclusions. Our outcomes indicated that the 2treatmentmodalitiesdelivered comparativeimpactswithcertainspecialcases.

The maxillary restriction was the major skeletal impact of the AdvanSync2.Thisconcurswithanotherresearchby Al-Jewairetal.testingtheequivalentappliance.[5] Al-Jewairetal.detailedanoveralldecreaseinSNAof3.3°,areduction in A-Na perp of 3.3 mm, and an increase in maxillary length (Co-A) of 1.8mm (from natural growth).[5] In anotherstudybySanthoshJayachandranetal.,SNA decreased by 2.1°, A-Na perp decreased by 2.0 mm, and Co-A increased by 1.7mm.[1] Inourstudy,SNAdecreasedby4.4°.Inallthethreestudies,overallmandibular and vertical skeletal changes with AdvanSync didn't vary altogether fromthe untreated controls.[3] Maxillary limitation has been shown with the Herbst and theMARA,yettheycanenhancemandibulargrowthtoo.[4]

Maxillary dentoalveolar changes with the AdvanSync in our investigationwere like the past examination, with no critical changes contrasted with the untreatedcontrols(exceptforaslightincisorextrusion,undoubtedlybecauseoffixedappliancemechanics)[4].Mandibularden toalveolarchangeswereadditionallyreliable with the past investigation, with the AdvanSync patients displaying incisorprotrusion and proclination and molar mesialization contrasted with their separatecontrolgroups.[4]However,Al-Jewairetal.revealedhugemandibularmolarextrusion with AdvanSync contrasted with the controls; this was not found in ourexamination.[5]Thismightbecreditedtovarietiesinthefixedappliancemechanics utilized. The noticed dentoalveolar changes with the AdvanSync were predictablegenerallywiththosedetailedininvestigationsincludingtheHerbstandtheMARA. [4,5]

Theresults of theinvestigationbyMcNamarashowedthatthepubertalgrowth spurt, in the permanent dentition, is the most good time frame to achieve amore noteworthy amount of mandibular skeletal impacts and a more modest measureofdentalcompensationatthelowerarchasforpre-orpost-topperiods.[15]Treatment with MARA and fixed appliances at a pre - peak development stage hadthe option to promptideal results at the degree of the maxillary skeletal structuresthat gave a more modest amount of sagittal advancement and length when contrastedwith untreated Class II control information.[2] The so- called' headgear-effect' thathas been depicted as a potential impact of the Herbst appliance (Hansen et al. 1991;Pancherz and Hägg, 1985) was found additionally in patients treated with the MARAbefore pubescence. Baccetti et al. found in his study that the pre pubertal phase ofdevelopment in presence of residual sutural action of the maxillary skeletal structurestookintoconsiderationtheidealresultinthemaxilla,consequentlyaffirmingprevious observations in a sample treated with the headgear, fixed appliances, andClass II elastics at the same stage in skeletal maturation. The early treatment groupdemonstrated some huge changes in the vertical parameters with a reduction in theintermaxillary skeletal divergency checked by a lot of decrease in the overbite (− 3.1mm on average when contrasted with controls).[15]Regarding the dentoalveolarlevel, the huge adjustments were situated at the lower arch with proclination of thelowerincisors. The absence of sagittal support because of the loss of the lowersecond deciduous molars, which was regular at some phase of the treatment in pre - peakpatients,wasjustsomewhatbalancedbythefixedappliance andthethick lingualarchconnectingthemolarbands.[15]Thismayhaverepresentedtheextrusionandmesializationofthelowerfirstmolars. Theseimpactsarefundamentally the same as those depicted by Baccetti et al. after the utilization ofClassIIelasticsincombinationwithfixedappliances.[15]

A limitation of this retrospective study is that only two time points before thetreatment phase and nine months after functional appliance removal was included.Therefore, the long-term effects could not be investigated. A time point at fixedorthodontic treatment should have been recorded. There are also inherent limitationswith the use of a small data base to compare the effects of Herbst and Advansync2fixedfunctionalappliancesinthe treatmentofclassIImalocclusion.

Unmistakablythevariousappliances have different treatment impacts, consequently various indications. As indicated by our study and that of Al-Jewairetal., patients requiring restriction of maxillary growth and proclination and protrusionof mandibular incisors, while keeping up the vertical growth pattern, appear to beunmistakably appropriate for AdvanSync treatment. Thusly, growing patients with askeletal Class IImalocclusionbroughtabout by maxillary prognathism whocanaffordmesializationofthemandibulardentitionaretheprimepossibilityforAdvanSync

treatment.As indicated by McNamara et al., maxillary prognathismisn't normal with skeletal Class II malocclusion.[14] Accordingly, patients who in aperfect condition match the prerequisites for AdvanSync treatment appear to be to bemoreuncommon.InpatientswithskeletalClassIImalocclusionsbecauseofmandibular retrognathism (most common) it appears to be more proper to utilizean appliance that can enhance mandibular development, for example, the Herbst ortheMARA.[15]TheHerbstappliance isshowninthetreatmentofmaxillaryprognathism,mandibularretrognathism(orblends),amplifiedsagittalinter-maxillary ANB angle, the retrusion of lower or protrusion of upperincisors (ormixes),andmildtomoderatecrowdingoftheupperdentalarch.[4]Therapywiththis appliance could be a decent decision rather than camouflage orthodontics, growthadaptationwithremovableappliances ororthognathicmedicalprocedure.[4]

We restricted our study to fixed functional appliances, Herbst and AdvanSync;numerous differentmodalities are accessible. Usually, appliances should be chosenfortheirprobability of satisfyingtheindividualpatientnecessitiesdependentonsoundevidence.

Theresultsofthisstudycanbeusedtofulfillthefollowingclinicallyrelevantobjectives:

1. Helpthecliniciandecidewhethertoapplythe Herbst fixed functional applianceinthetreatmentofclassIImalocclusion.
2. Helpthecliniciandecidewhethertoapplythe AdvanSyncfixedfunctionalapplianceinthetreatmentofclassIImalocclusion.
3. Helpthecliniciantoassessandevaluateeffectsof Herbstinthetreatmentofclass IImalocclusion.
4. Helpthecliniciantoassessandevaluate AdvanSync2 inthetreatmentofclassIImalocclusion.
5. Helpthecliniciancomparetheeffectsof Herbstand AdvanSync2fixedfunctionalappliancesinthe treatmentofclassIImalocclusion.

Conclusion: -

Thefollowingfootprintswerelaidoutwithintheboundsofthisstudy:

1. AdvanSync2and Herbstappliancewereeffectiveinnormalizing ClassIImalocclusions.
2. AdvanSync2corrected ClassII malocclusionsthroughC0-GN, C0-GO, andUI A.
3. HerbstappliancecorrectedClassIImalocclusionsprimarilythroughSNA, SNB, WITZ, CO-A,ANB,UI-A,LI-B,LIB,UL-EPL,andFMA.

Fig 1 (Herbst Case): Pre-treatment Extraoral Photographs(A,B,C&D) with VTO(E)

Fig 2: Pre functional Intraoral Photographs(Herbst Case)

Fig 3: Herbst appliance Intraorally

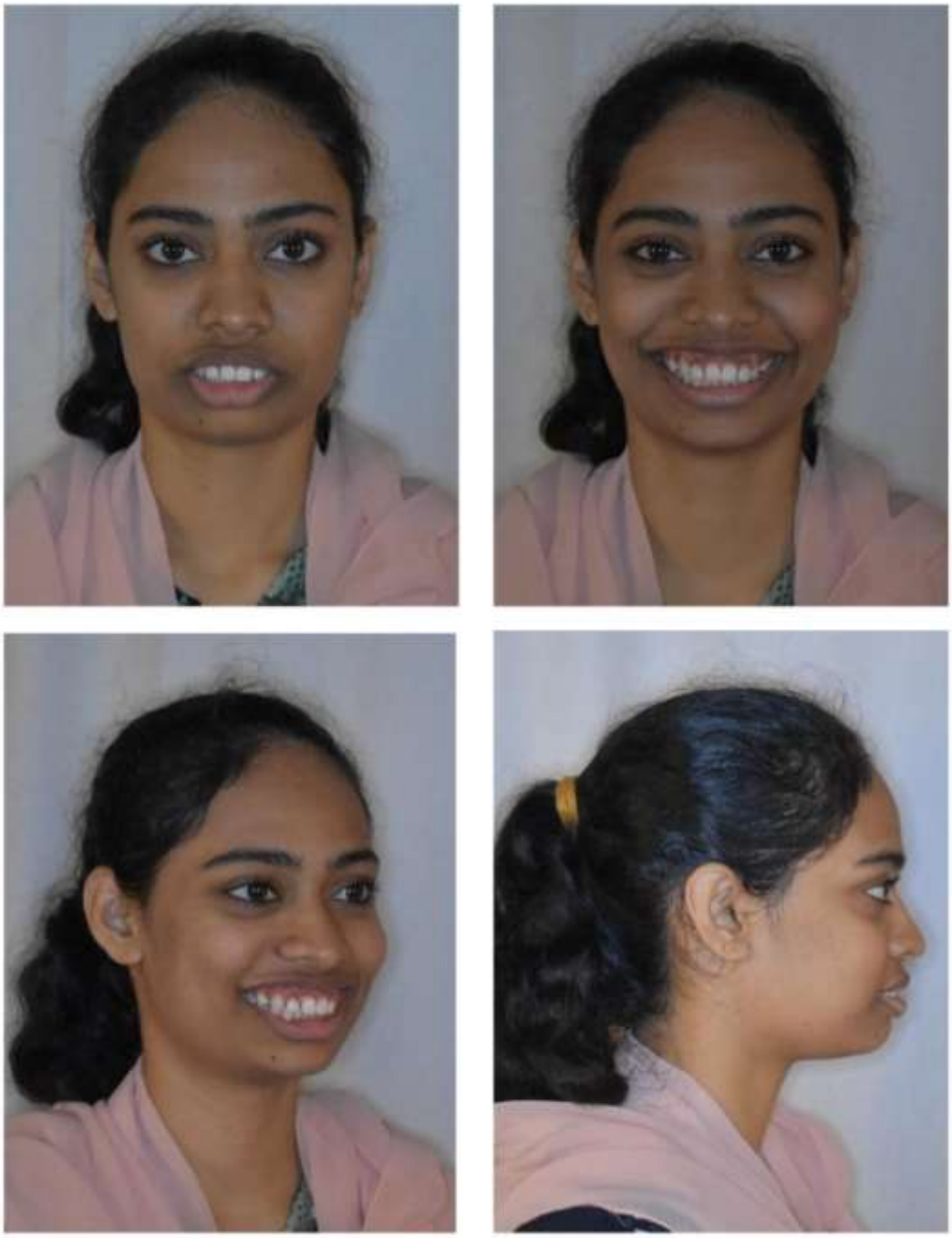


Fig 4: Post Functional Extraoral (Herbst Case)

Fig 5: Post Functional Intraoral (Herbst Case)

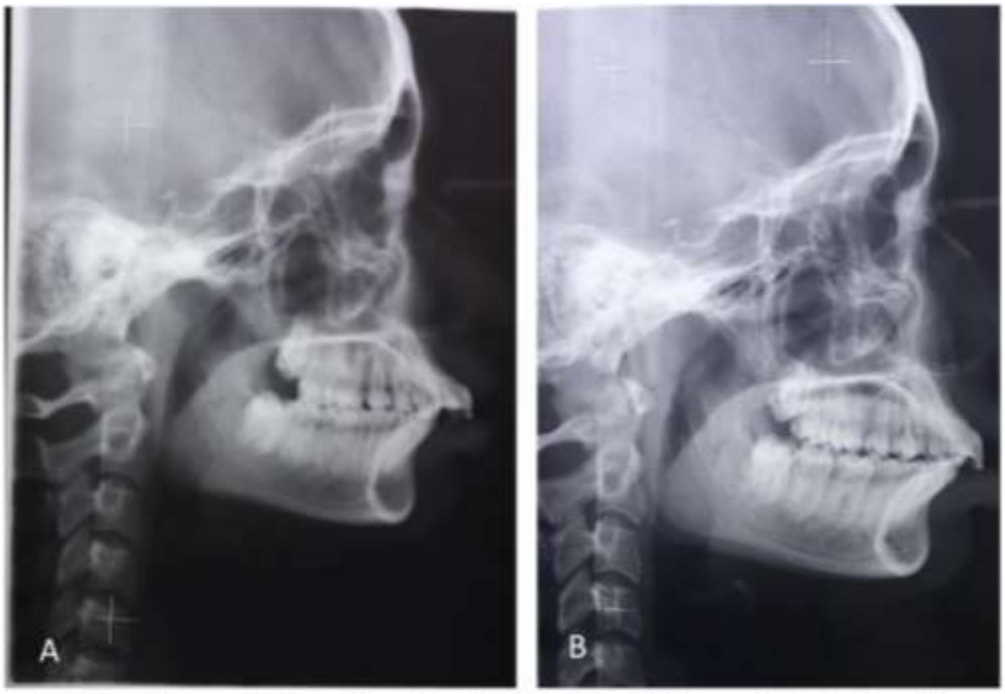


Fig 6 : A-Pre and B-Post functional Lateral Cephalogram(Herbst Case)

Fig 7 (Advansync2 Case): Pre-treatment Extraoral Photographs(A,B,C&D) with VTO(E)

Fig 8: Pre functional Intraoral Photographs(Advansync2 Case)

Fig 9: Advansync2 appliance Intraorally

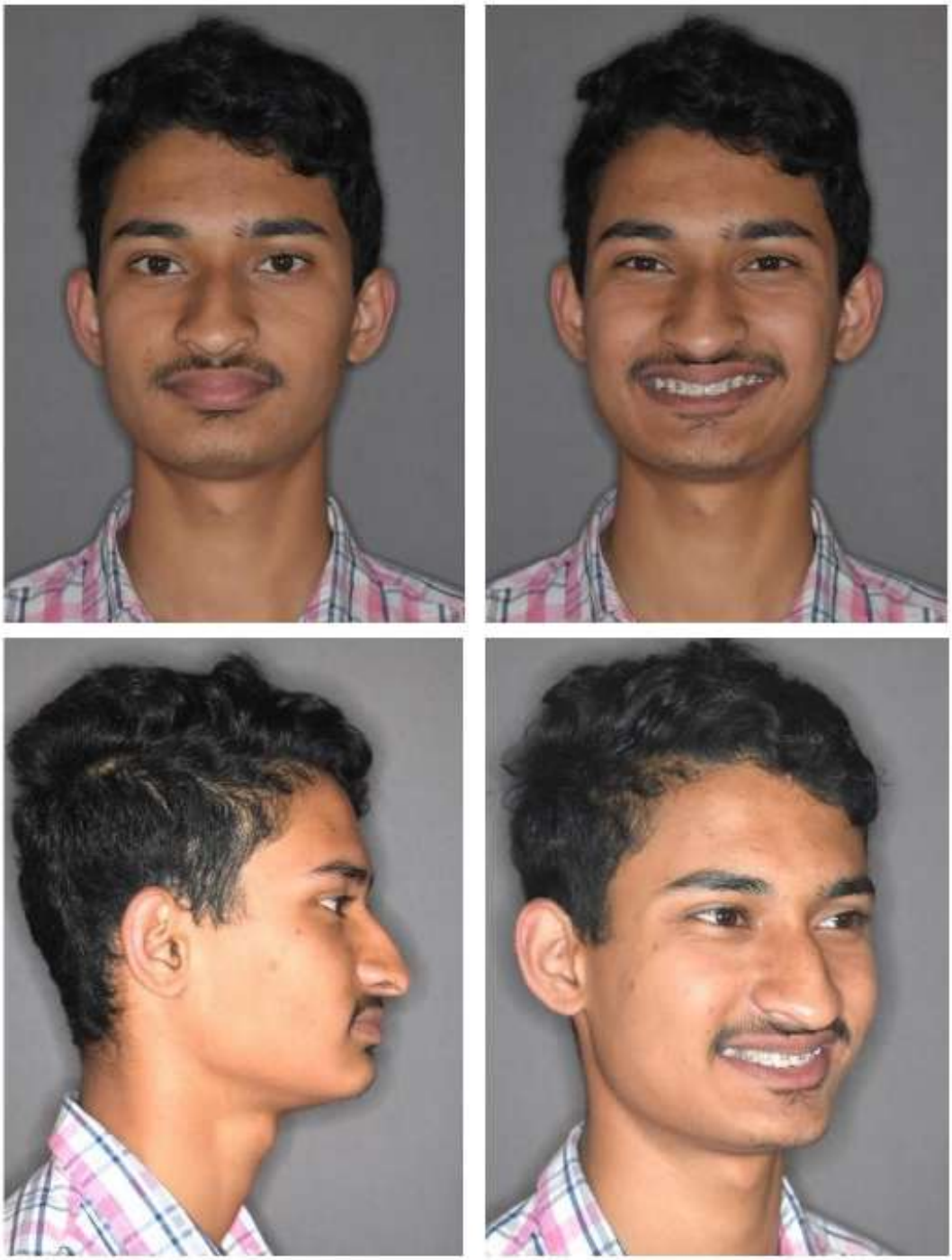


Fig 10: Post Functional Extraoral (Advansync2 Case)

Fig 11: Post Functional Intraoral (Advansync2 Case)

Fig 12 : A-Pre and B-Post functional Lateral Cephalogram(Advansync2 Case)

Bibilography:-

1. Flores-Mir C, Ayeh A, Goswani A, Charkhandeh S. Skeletal and dental changes in Class II division 1 malocclusions treated with splint-type Herbst appliances: A systematic review. Angle Orthod. 2007;77(2):376-381. doi:10.2319/0003-3219(2007)077[0376:SADCIC]2.0.CO;2
2. Koay WL, Yang Y, Tse CSK, Gu M. Effects of Two-Phase Treatment with the Herbst and Preadjusted Edgewise Appliances on the Upper Airway Dimensions. Sci World J. 2016;2016. doi:10.1155/2016/4697467
3. Celikoglu M, Buyuk SK, Ekizer A, Unal T. Treatment effects of skeletally anchored Forsus FRD EZ and Herbst appliances: A retrospective clinical study. Angle Orthod. 2016;86(2):306-314. doi:10.2319/040315-225.1
4. Jayachandran S, Wiltshire WA, Hayasaki SM, Pinheiro FHSL. Comparison of AdvanSync and intermaxillary elastics in the correction of Class II malocclusions: A retrospective clinical study. Am J OrthodDentofacOrthop. 2016;150(6):979-988. doi:10.1016/j.ajodo.2016.05.008
5. Al-Jewair TS, Preston CB, Moll EM, Dischinger T. A comparison of the MARA and the AdvanSync functional appliances in the treatment of Class II malocclusion. Angle Orthod. 2012;82(5):907-914. doi:10.2319/090411-569.1
6. Siara-Olds NJ, Pangrazio-Kulbersh V, Berger J, Bayirli B. Long-term dentoskeletal changes with the Bionator, Herbst, Twin Block, and MARA functional appliances. Angle Orthod. 2010;80(1):18-29. doi:10.2319/020109-11.1
7. Pancherz H, Anehus-Pancherz M. The headgear effect of the herbst appliance: A cephalometric long-term study. Am J OrthodDentofacOrthop. 1993;103(6):510-520. doi:10.1016/0889-5406(93)70090-B
8. VanLaecken R, Martin CA, Dischinger T, Razmus T, Ngan P. Treatment effects of the edgewise Herbst appliance: A cephalometric and tomographic investigation. Am J OrthodDentofacOrthop. 2006;130(5):582-593. doi:10.1016/j.ajodo.2005.01.030
9. Valant JR, Sinclair PM. Treatment effects of the Herbst appliance. Am J OrthodDentofacOrthop. 1989;95(2):138-147. doi:10.1016/0889-5406(89)90392-2

10. Ahmadian-Babaki F, Araghbidi-Kashani SM, Mokhtari S. A cephalometric comparison of twin block and bionator appliances in treatment of class II malocclusion. J Clin Exp Dent. 2017;9(1):e107-e111. doi:10.4317/jced.53031
11. Nelson B, Hansen K, Hägg U. Class II correction in patients treated with class II elastics and with fixed functional appliances: a comparative study. Am J Orthod Dentofacial Orthop. 2000;118(2):142-149. Am J OrthodDentofacOrthop. 2000;118(2):142-149.
12. Baysal A, Uysal T. Dentoskeletal effects of Twin Block and Herbst appliances in patients with Class II division 1 mandibular retrognathy. Eur J Orthod. 2014;36(2):164-172. doi:10.1093/ejo/cjt013
13. Cacciatore G, Ghislanzoni LTH, Alvetro L, Giuntini V, Franchi L. Treatment and posttreatment effects induced by the Forsus appliance: A controlled clinical study. Angle Orthod. 2014;84(6):1010-1017. doi:10.2319/112613-867.1
14. McNamara JA, Hinton RJ, Hoffman DL. Histologic analysis of temporomandibular joint adaptation to protrusive function in young adult rhesus monkeys (Macaca mulatta). Am J Orthod. 1982;82(4):288-298. doi:10.1016/0002-9416(82)90463-8
15. Baccetti T, Franchi L, Toth R. ORIGINAL ARTICLE Treatment timing for Twin-block therapy. Am J OrthodDentofacOrthop. 2000;118:159-170.
16. Gunay EA, Arun T, Nalbantgil D. Evaluation of the immediate dentofacial changes in late adolescent patients treated with the ForsusTM FRD. Eur J Dent. 2011;5(4):423-432. doi:10.1055/s-0039-1698915
17. EL Mofty MH, Ibrahim SA, EL-Shall OS, Tawfik WA. Evaluation of Dentoskeletal Changes Accompanying the Treatment of Class II Malocclusion by Advansync Appliance versus Intermaxillary Coil Spring Mechanics. Al-Azhar Dent J Girls. 2018;5(4):373-383. doi:10.21608/adjg.2018.20023
18. Anić-Milošević S, Lapter-Varga M, Laj M. Analysis of the soft tissue facial profile by means of angular measurements. Eur J Orthod. 2008;30(2):135-140. doi:10.1093/ejo/cjm116
19. Negi G, Ponnada S, Aravind NKS, Chitra P. Photogrammetric correlation of face with frontal radiographs and direct measurements. J Clin Diagnostic Res. 2017;11(5):ZC79-ZC83. doi:10.7860/JCDR/2017/28249.9924
20. Yin K, Han E, Guo J, Yasumura T, Grauer D, Sameshima G. Evaluating the treatment effectiveness and efficiency of Carriere Distalizer: a cephalometric and study model comparison of Class II appliances. Prog Orthod. 2019;20(1). doi:10.1186/s40510-019-0280-2
21. Pangrazio-Kulbersh V, Berger JL, Chermak DS, Kaczynski R, Simon ES, HaerianA.Treatment effects of the mandibular anterior repositioning appliance on patients with Class II malocclusion. Am J OrthodDentofacOrthop. 2003;123(3):286-295. doi:10.1067/mod.2003.8
22. Aras I, Pasaoglu A, Olmez S, Unal I, Tuncer AV, Aras A. Comparison of stepwise vs single-step advancement with the Functional Mandibular Advancer in Class II division 1 treatment. Angle Orthod. 2017;87(1):82-87. doi:10.2319/032416-241.1
23. Dischinger BM.Skeletal class II case presentation: Utilization of the advansync2 appliance. APOS Trends Orthod2018; 8:168-74.
24. Chitra P, Negi G, Thushar BK, Verma S. Treatment Outcomes in the Sagittal and Vertical Dimensions with the Advansync2 Class II Corrector- A case Series. J ContempOrthod 2018;2(3):14-