

The role of therapeutic exercise in the rehabilitation of temporomandibular joint disorders after a fixed orthodontic treatment

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الكلمات الدالة : التمرينات العلاجية - الفك الصدغي - التقويم الثابت

ملخص البحث

يهدف البحث الي التعرف علي دور التمرينات العلاجية في تأهيل اضطرابات الفك الصدغي بعد علاج التقويمي الثابت. واستخدم الباحثين المنهج الوصفي لملائمة لطبيعة البحث علي عينة عشوائية قوامها 160 اخصائي تقويم اسنان وعلاج طبيعى مستخدمين استيماارة لمعرفة دور التمرينات العلاجية في تحسين اضطرابات الفك الصدغية بعد اجراء تقويم الاسنان الثابت واسفرت اهم النتائج علي :

- 1-ان التمرينات العلاجية لها دور اساسي لتحسين اضطرابات الفك الصدغي بعد اجراء تقويم الاسنان الثابت
- 2-ان جل افراد عينة البحث لايقوموا بوصف بعض التمرينات والحركات العلاجية لمن تسدعي حالته ذلك.
- 3-ان جل افراد عينة البحث موافقين ان طول مدة العلاج التقويمي الثابت للاسنان الغير مدروسة تؤثر بالسلب علي صحة المفصل الصدغي مما يستوجب اجراء تمرينات علاجية لتحسين اضطراب الفك الصدغي.

summary

The research is aimed to identify the role of therapeutic exercises for Tempormandibular joint disorders rehabilitation after fixed orthodontic treatment. The researchers adopted the descriptive approach due to the conformity with the nature of the study which included a random sample of 160 orthodontic therapy's specialists subjected to questionnaire form' to identify the role of therapeutic exercises for Tempormandibular joint disorders rehabilitation after fixed orthodontic treatment the most important results are as the following:

- 1- the therapeutic exercises have essential role for Tempormandibular joint disorders rehabilitation after fixed orthodontic treatment.
- 2-The majority of specialists represented the sample did not include some of the therapeutic exercises for patients needed such exercises.
- 2- The majority of specialists represented the sample have agreed that duration of unspecified fixed orthodontic treatment, has negative effect on TMJ which require therapeutic exercises to improve Tempormandibular joint disorders

Introduction& research problem

the therapeutic exercises are considered one of medical braches which provide services for individuals by treating medical cases in natural way, as well as giving hope for the treatment cases (alkhyat-2006).

xercise aiming to improve strength and flexibility of muscles jaw line and enhance the misaligned of the jaws. Reduce the pain and restore muscles function, improve facial and nick muscles, (2018 alabdelli).

(Mohamed al-aydi)(2018) : - therapeutic exercises are able to treat Tempormandibular joint disorders and considered a part of comprehensive therapy as well as other required procedures recommended by physiotherapist such as changing the pattern of bite and nutrition in addition to the usage of Tempormandibular joint correction devices (orthodontic)(alaydi-2018).

After the removal of fixed orthodontic treatment exercises plays an important role in Temporomandibular joint disorders rehabilitation, these exercises strengthen the muscles flexibility and improve balance and correct jaw movement, researchers Realize that therapeutic exercises may solve problems tempormandibular immediately or in the long run, achieving good results requires patience and regularity in exercising according to the plan supervised by the oral and maxillofacial specialist. (A-shoumri 2015).

Tempormandibular therapeutic exercises could be useful for strengthen the muscles and improving balance and correct jaw movement, but it may not be able to treat the main causes of Tempormandibular joint disorders such as jaw strain or prolapsed disc additional treatment might help in such cases rehabilitations exercises may vary according to the injury type, some rehabilitation Programs are designed according to type of injury, joints, muscles, ligaments, orthopedics and neurology. These exercises may include stretching, muscles strengthening, movement coordination, exercises are gradually organized intensity

increases with time supervised by physiotherapist or qualified sport coach specialist (Al sharah 2017).

A fixed orthodontic is made in order to correct teeth position as well as bite by using arch wire braces: -

Arch wire consist of steel wire connects teeth by brackets slots to be adjusted regularly to enhance teeth position.

Brackets: a small rectangle that are cemented to each tooth to generate mechanical forces that are transmitted through bracket to move teeth and correct malocclusion spacing and /or crowding maintain teeth in their current position.

Bands: orthodontic bands are thin metal rings fit around the molars (back teeth).

Elastics: elastic ligatures are rubber bands on orthodontic braces their purpose to keep the arch wire firmly slotted in position on the bracket of each individual tooth.

all these measures are taken when arch wire is corrected, bands and elastics are changed regularly during dentist frequent visits. These procedures could go on for several months to years in order to guarantee good results. (Schiffman, Ohrbach, Truelove, & Look 2014)

Taking good care of your teeth and mouth in personal hygiene to protect the jaw and follow the dentist instructions during dentist routine visits as some side effects may occur while Temporomandibular joint disorders. which require therapeutic exercises to make condition generally better. (Peak,Goulet, 2014).

There for the researchers confirm that the role of therapeutic exercises for Temporomandibular joint disorders in rehabilitation after fixed orthodontic treatment must be subjected to more study by the physiotherapist to explore the suitable therapeutic exercises for granting the treatment of patient.

Research objectives:

- the research aims to recognize the role of therapeutic exercises for Tempormandibular joint disorders in rehabilitation after fixed orthodontic treatment: -

research inquiries: -

1-what is the role of therapeutic exercises for Tempormandibular joint disorders in rehabilitation after fixed orthodontic treatment?

2-what is the proportional ranking of therapeutic exercises for the Tempormandibular joint disorder's in rehabilitations after fixed orthodontic treatment?

Study terminology:**therapeutic exercises :**

"are type of physical practices strengthen the muscles flexibility and improve balance in order to enjoy better health and be able to carry on with daily life" (Parsons2018)

Tempormandibular joints:

" joints that connect the lower jaw to the skull and it's called" (TMJ) (Peak,Goulet,2014).

Fixed Orthodontic treatment:

" is a dental specialty focused on aligning the bite and straightening the teeth. This is achieved using brackets and small pieces of metal (brackets) fixed to the teeth and connected to fixed wires." (Alhossni 2019).

1-study (Ahmed Mohamed Abduelkhalek):- Ellaf Ahmed Alshumari 2020):-

The effect of therapeutic exercises on partial tears of the rotator cuff rehabilitation of basketball players.

The study aims to recognize the effect of therapeutic exercises as one of the basic physical manners in the treatment of sport injuries, both researchers demonstrated the problem of carelessness about therapeutic exercises as tool for treating the injured players particularly partial tears of the rotator cuff injuries, the researchers have adopted the experimental approach cope with the nature of study research ,the study sample consisted of(6)basketball players, results were demonstrated , discussed and researchers concluded that there is an effect to the role of therapeutic exercises on partial tears of the rotator cuff rehabilitation, both researchers recommended the effectiveness of such therapy on other sports injuries as well. The role of rehabilitation and its benefits on players performance post injury therapy (Abdukhalek & Alshumri 2019).

2- Study of (Wakal Adel,Massoudan makhlouf-2019):-

The role of therapeutic exercises in diminishing psychological disorders of paraplegia injuries.

The research study focuses on the role of therapeutic exercises in diminishing psychological disorders of paraplegia injuries, in this regard a questionnaire form has been distributed on study sample consisted of 10 paraplegia injuries as result of brain stroke and subjected to movement physiotherapy center at (julfa area),the researchers received the assistance of physiotherapist who distributed the questionnaire form to injured players representing the study sample concluded the research assumption

(Wakal, makhlouf-2019).

Research process steps

Research Methodology

the researchers adopted the descriptive approach which is cope with the nature of study research.

research community

The research community includes specialists in dentistry (orthodontics) and specialists in physical therapy and rehabilitation in the city of Tripoli, numbering (483) specialists between public and private treatment centers.

Population sample:

The sample was selected randomly of total number (160) specialist, dentist and physiotherapist the percentage of research sample represented (%33.126) of group sample.

Homogeneity of sample individuals:

The researchers chosen the experience as similar item for the sample group the following table(1) indicate the homogeneity of selected personal

variables	Scale unit	mean	Standard Deviation	median	Torsion coefficient
experience	year	7.21	1.965	7	0.658

(Table 1) indicates the torsion coefficient value (0.658) ranges (plus or minus 3) homogenous experience.

Survey study

The researchers conducted a survey study in the period from (21/5/2022 to 28/5/2022) by distribution of questionnaires forms in its initial form on 15 expertise in order to specify the suitable therapeutic exercises for Tempormandibular joint disorders in rehabilitation after fixed orthodontic treatment.

Research tools

questionnaires forms (data collection methods)

1- **office study method**:- this approach is to recognize the theoretical concepts by reviewing references, books, scientific reports, circulations, resolutions related to the subject and the applicable policy at Libyan institutions.

2-**personal interviews** - various number of interviews are carried out by the researchers with experts of dental treatment as well as physiotherapists in Libyan regions or gathering information related to therapeutic exercises and fixed orthodontic treatment, the researchers carried out interviews with physical education experts as well as sport science representative in Tripoli.

3-on site survey study approach:-

The objective of this method is to answer the questions with regard to the study and seek the assistance of the collected data obtained by the questionnaires forms. (Hafed 1981)

the researchers prepared the interview questionnaires forms as well as previous reports and studies. therefore 8 questions were prepared based on specified criteria and conditions according to the directives of the expertise.25 therapy manners were set based on results of questionnaires forms, which concluded three phases:

1- preliminary drafting phase: - in this stage, researchers depended on previous results of reports and studies as well as personal interviews and behavior patterns that help on field training students and to be familiar with teaching skills as well.

2- redrafting phase: -the researchers demonstrated questionnaires forms to group of experts specialized in fixed and movable orthodontic treatment, as well as physiotherapist

rehabilitation, many remarks were taking into consideration particularly the research sample (8) questions and (25) therapeutic exercises and rehabilitation of Tempormandibular joint disorders after fixed orthodontic treatment.

3- final draft stage: -the questionnaires forms is concluded and agreed upon.

Scientific transactions for the questionnaire form

Validity of the questionnaire

Reliability of questionnaires forms The researchers distributed the questionnaires forms in its final draft on 15 expertise in order to specify the Reliability of measurement the approval percent (90%).

The stability of the questionnaire form

- the researchers have used likert scale to calculate Internal consistency which estimated (%98.0).

Statistical correlations

-the researchers applied (SPSS) static package for social science with the following parameters

Mean.

Median.

Standard deviation.

Torsion coefficient.

Percentage.

Relative weight.

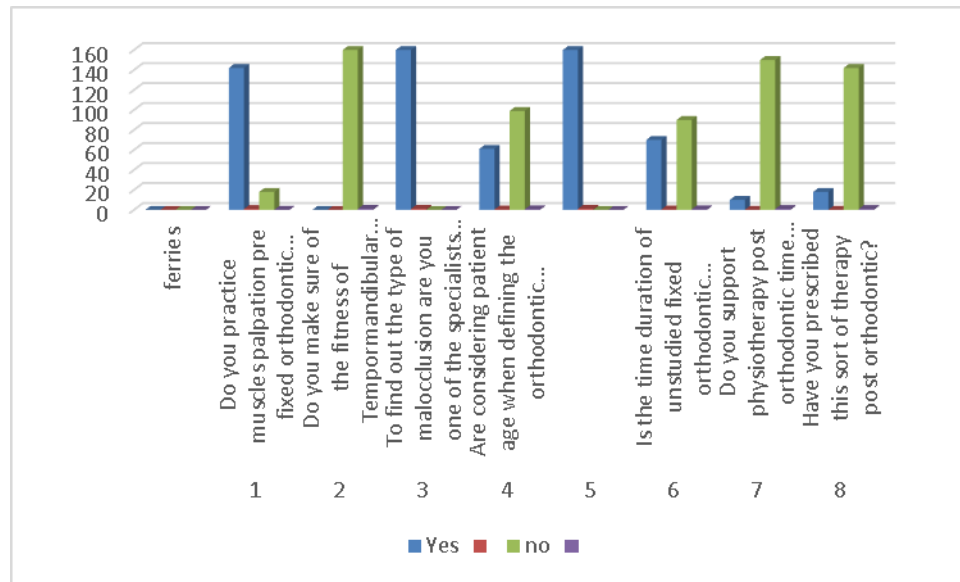
Presentation and discussion of research results

Table (2) research sample acceptance to the role of therapeutic exercises and rehabilitation of Tempormandibular disorder's after fixed orthodontic treatment

n =160

no	phrases	yes		no	
		repetition	percentage	repetition	percentage
1	Do you practice muscles palpation pre fixed orthodontic treatment?	142	88,80%	18	11.30%
2	Do you make sure of the fitness of Tempormandibular joint by experimental diagnosis asking the patient on his condition?	160	100%	0	0
3	To find out the type of malocclusion are you one of the specialists who rely on CEPHALOMETRIC diagnoses?	160	100%	0	0
4	Are considering patient age when defining the orthodontic treatment?	61	38.10%	99	61.90%
5	Is the time duration of unstudied fixed orthodontic treatment has negative effect on Tempormandibular joint ?	160	100%	0	0
6	Do you support physiotherapy post orthodontic time duration ?	70	43.80%	90	56.30%
7	Have you prescribed this sort of therapy post orthodontic?	10	6.30%	150	93.80%
8	Do you prescribe some physiotherapies who ever requires that therapy?	18	1130%	142	88.80%

Table 2 indicates the percentage of acceptance among the selected sample on the role therapeutic exercises and rehabilitation of Tempormandibular joint disorders after fixed orthodontic treatment ranges between 6.30% and 100% take the precaution measures when receiving patients, ranges between 0% and 93.80% don't take the precaution measures, when receiving such patients.



Shape (1).

1- Do you practice muscles palpation pre fixed orthodontic treatment: - answers to this clause indicated in the above mentioned table 2 the repetition (142) with percentage (88.80%) answered (yes).

2- Do you make sure of the fitness of Tempormandibular joints by experimental diagnosis asking the patient on his condition answers to this clause indicated in the above mentioned table 2 the repetition (160) with percentage (100%) answered (yes).

3- To recognize resisted. closing do you depend on orthodontic cephalomatic diagnose answers to this clause indicated in the above mentioned table 2 the repetition (160) with percentage (100%) answered (no).

4- Are considering patient age when defining the orthodontic treatment answers to this clause indicated in the above mentioned table 2 the repetition (99) with percentage (61.90%) answered (no).

5- Is the time duration of unstudied fixed orthodontic treatment has negative effect on Tempormandibular joint disorders: diagnoses answers to this clause indicated in the above mentioned table 2 the repetition (160) with percentage (100%) answered (yes).

6- Do you support physiotherapy post orthodontic time duration treatment answers to this clause indicated in the above mentioned table 2 the repetition (90) with percentage (56.30%) answered (no).

7- Have you prescribed this sort of therapy post orthodontic answers to this clause indicated in the above mentioned table 2 the repetition (150) with percentage (93.80%) answered (no).

8- Do you prescribe some physiotherapies who ever requires that therapy answers to this clause indicated in the above mentioned table 2 the repetition (142) with percentage (80.80%) answered (no).

Table (3) The Mean, , Standard Deviation, Relative weight ,selected sample responses regarding the role of therapeutic exercises and rehabilitation of Tempormandibular joint disorders after fixed orthodontic treatment .

no	phrases	rank	mean	s.daviation	r.weight	opinion
1	rubbing cheek muscles sit chair tall both hands on jaws at the end of jaw joint little compress with 3 fingers on cheek and rub down on tensed muscles	12	2.6	0.65	88%	agreed
2	Thumb behind the ear compress in circular way down ward	1	2.9	0.39	95%	Agreed
3	Relaxing jaw muscles ,sit chair tall hands on jaws ,gentle stress on jaws with hand palm open and close the mouth slowly	10	2.6	0.61	86%	Agreed
4	Relaxing jaw muscles ,sit chair tall thumb middle finger both sides of the face lifting up the cheeks up ward for 10 seconds	13	2.6	0.66	86%	Agreed
5	Laughing & yawning these exercises are easily done it relaxes face muscles	16	2.6	0.71	86%	Agreed
6	Sitting on chair , hand on knees, mouth shut tongue pressing on upper mouth wall	18	2.5	0.73	48%	Agreed
7	Sitting on chair index finger on jaw joint other finger on chin	8	2.7	0.60	89%	Agreed

8	Mouth wide open both fingers pressing maintain tongue position	17	2.5	0.72	83%	Agreed
9	Sitting on chair thumb under chin ,open mouth pressing the thumb on chin	4	2.7	0.49	91%	Agreed
10	Sitting on chair thumb under chin, moving thumb to both sides of jaws	3	2.8	0.56	92%	Agreed
11	Sitting on chair thumb under chin ,index finger pressing between chin and lower lip, mouth open pressing thumb on the area for 5-10 seconds	14	2.6	0.66	86%	Agreed
12	Sitting on chair , hands on cheeks blowing mouth air on candles or water	15	2.6	0.67	85%	Agreed
13	Sitting on chair , hand on knees, with inhalation keeping air in mouth for longest time	21	2.3	0.79	76%	Agreed
14	Sitting on chair thumb under chin ,mouth open, resist closing	5	2.7	0.55	90%	Agreed
15	Sitting on chair , hands on cheeks ear compress in circular way down ward anti clock wise	9	2.6	0.59	87%	Agreed
16	Sitting on chair , hands on cheeks, mouth closed on back teeth, tongue pressing on upper mouth wall, mouth slowly open for 5 seconds	20	2.4	0.81	81%	Agreed
17	Sitting on chair , hands on cheeks, jaw moving back and forward	7	2.7	0.57	91%	Agreed
18	Sitting on chair , hands on cheeks, jaw is moving asides	2	2.8	0.47	93%	Agreed
19	Sitting on chair , hands on cheeks, pressing up ward	6	2.7	0.56	89%	Agreed
20	Sitting on chair , hands on cheeks, draw down ward	11	2.6	0.65	87%	agreed
21	Sitting on chair fingers closed ,the pink finger on sternum bone, the chin is on the fingers directly head nick tilted aside	22	2.2	0.81	75%	Sort of
22	Lying on bed nick is tilted on the bed pushing your nick forward while looking to chest	24	2.1	0.81	71%	Sort of
23	lying on bed on your side lifting your nick up ward	23	2.1	0.78	69%	Sort of
24	Sitting on chair, lifting your shoulders	25	2.0	0.88	65%	Sort of
25	Prostration ,arms forward ,head up clinching on the beck teeth wide smile	19	2.5	0.73	82%	Agreed
	total		63.2	6.30	84%	Agreed

It is clear from Table (3), which concerns the arithmetic mean, standard deviation, and relative weight of the answers of the research sample members regarding the role of therapeutic exercises in rehabilitating temporomandibular disorders after fixed orthodontic treatment, that the relative weight ranged between (71% to 95%), with a total of (84%) for the prevailing opinion. – OK

Table(4) The Mean , , Standard Deviation, Relative weight ,selected sample responses regarding the role of therapeutic exercises and rehabilitation of Temporomandibular disorder's after fixed orthodontic treatment

no	phrases	mean	Standard deviation	Chi square	opinion
1	rubbing cheek muscles sit chair tall both hands on jaws at the end of jaw joint little compress with 3 fingers on cheek and rub down on tensed muscles	2.6	0.65	*118.962	agreed
2	Thumb behind the ear compress in circular way down ward	2.9	0.39	*204.650	agreed
3	Relaxing jaw muscles ,sit chair tall hands on jaws ,gentle stress on jaws with hand palm open and close the mouth slowly	2.6	0.61	*82.212	agreed
4	Relaxing jaw muscles ,sit chair tall thumb middle finger both sides of the face lifting up the cheeks up ward for 10 seconds	2.6	0.66	*85.962	agreed
5	Laughing & yawning these exercises are easily done it relaxes face muscles	2.6	0.71	*97.400	agreed
6	Sitting on chair , hand on knees, mouth shut tongue pressing on upper mouth wall	2.5	0.73	70.962*	agreed
7	Sitting on chair index finger on jaw joint other finger on chin	2.7	0.60	*114.987	agreed
8	Mouth wide open both fingers pressing maintain tongue position	2.5	0.72	*64.288	agreed
9	Sitting on chair thumb under chin ,open mouth pressing the thumb on chin	2.7	0.49	*129.763	agreed
10	Sitting on chair thumb under chin, moving thumb to both sides of jaws	2.8	0.56	*166.250	agreed
11	Sitting on chair thumb under chin ,index finger pressing between chin and lower lip, mouth open pressing thumb on the area for 5-10 seconds	2.6	0.66	*83.413	agreed
12	Sitting on chair , hands on cheeks blowing mouth air on candles or water	2.6	0.67	*80.038	agreed
13	Sitting on chair , hand on knees, with inhalation keeping air in mouth for longest time	2.3	0.79	*20.112	agreed
14	Sitting on chair thumb under chin ,mouth open, resist closing	2.7	0.55	*128.112	agreed
15	Sitting on chair , hands on cheeks ear compress in circular way down ward anti clock wise	2.6	0.59	*94.887	agreed

16	Sitting on chair , hands on cheeks, mouth closed on back teeth, tongue pressing on upper mouth wall, mouth slowly open for 5 seconds	2.4	0.81	69.837	agreed
17	Sitting on chair , hands on cheeks, jaw moving back and forward	2.7	0.57	*150.350	agreed
18	Sitting on chair , hands on cheeks, jaw is moving asides	2.8	0.47	*165.987	agreed
19	Sitting on chair , hands on cheeks, pressing up ward	2.7	0.56	*113.112	agreed
20	Sitting on chair , hands on cheeks, draw down ward	2.6	0.65	*97.663	agreed
21	Sitting on chair fingers closed ,the pink finger on sternum bone, the chin is on the fingers directly head nick tilted aside	2.2	0.81	*15.388	Sort of
22	Lying on bed nick is tilted on the bed pushing your nick forward while looking to chest	2.1	0.81	*4.588	Sort of
23	lying on bed on your side lifting your nick up ward	2.1	0.78	*3.050	Sort of
24	Sitting on chair, lifting your shoulders	2.0	0.88	*6.950	Sort of
25	Prostration ,arms forward ,head up clinching on the beck teeth wide smile	2.5	0.73	*56.338	agreed
	total	63.2	864.30	*54.650	agreed

Table (4) The Mean, Standard Deviation, value of CHI square selected sample responses regarding the role of therapeutic exercises and rehabilitation of TMJD after fixed orthodontic treatment ranged (204.650 to 3.050) of total (54.650), indicates that there is variation.

Through the previous results, the researchers concluded that rehabilitation exercises have an effective and important role in the treatment of temporomandibular joint disorders after fixed orthodontic treatment, as they aim to strengthen the muscles surrounding the jaw, improve its mobility, and relieve pain and tension in this area. Among the most important problems that people suffer from in the temporomandibular joint after completing fixed orthodontic treatment are as follows: -Difficulty opening the mouth, pain in the jaw, crackling sound when opening the mouth, toning the jaw. Exercises for the temporomandibular joint help strengthen the muscles surrounding the jaw, including the temporal muscles and other jaw muscles. Strengthening these muscles can help improve the stability and flexibility of the jaw, thereby reducing pain and tension. Improve jaw mobility: therapeutic exercises aimed at improving jaw mobility and flexibility. When the jaw is properly mobile and able to open and close smoothly, pain can be reduced and overall jaw function improved. Relieve pain and tension: temporomandibular joint exercises can help relieve

pain and tension associated with temporomandibular joint inflammations, muscle spasms, and joint compression. Regular practice of therapy exercises can reduce muscle spasms and restore balance to the jaw. Improve quality of life: if you have problems with the temporomandibular joint, it may affect the quality of your daily life and your ability to set up routine activities such as talking, chewing and smiling. When you do the appropriate treatment exercises, it can improve jaw function and restore the ability to carry out daily activities normally and through this the researchers concluded that there is an effective role of the exercises under consideration in the rehabilitation of TMJ disorders after fixed orthodontic treatment.

conclusion

1- therapeutic exercises are essential in enhancing rehabilitation of Tempormandibular joints disorder's after fixed orthodontic treatment.

2-majority of selected sample are not obligated to the therapy prescribed for those needed the treatment.

3- majority of selected sample agreed the long duration of therapy may reflect negatively on fixed orthodontic treatment.

4- Thumb behind the ear compress in circular way down ward, sitting on chair, hands on cheeks, jaw is moving asides, sitting on chair thumb under chin, mouth open, resist closing, are the most important treatment.

5- Sitting on chair, lifting your shoulders, lying on bed nick is tilted on the bed pushing your nick forward while looking to chest, lying on bed on your side lifting your nick upward.

6- after fixed orthodontic treatment, patients may suffer some difficulties of opening and closing, muscle pain Tempormandibular joint.

Recommendation: -

- 1-the assurance on carrying out more researchers in participation with specialized clinics to set therapeutic exercises.
- 2 - To find out the type of malocclusion, it is necessary to conduct CEPHALOMETRIC diagnostics to confirm the type of malocclusion either in the jawbone or in the dental arch, or both.
- 3 -patients should be taken care by the physiotherapist to supervise the exercises in proper manner.
- 4 -muscle treatment enhance the stability of Tempormandibular, joint.
- 5 - strengthen the general health, Tempormandibular joint, facial exercises, mouth cleaning, mouth gargle, tongue cleaning.
- 6 -several persons are suffering anxiety pre visiting the dental clinics, breathe exercises sessions.

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