The Effect of a Posture & Recreation Program on Knock – Knees, Flat Feet and the Level of Psychological Stress among The12-15Year-Old Students

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The aim of this paper Is to identify the effect of a posture & recreation program on knock – Knees, flat feet and the Level of psychological stress among the 12-15 year-old students. The experimental method was used on one experimental sample for p re-post measurements. The program was applied ten 12-15 age students ,with a knock knees deviation associated with postural flat foot. Results of the study showed there are differences between the pre-post measurements of the knock - knee variables. There are differences between the pre-post measurements of the feet deformities variables. There are differences between the pre-post measurements in the total score of the psychological stress scale.The proposed program has led to an improvement of the postural deformities of the knock-knees, as it led to improving the distance between the two medial lumps of the tibia and the two angles of the lateral knees.The proposed program led to an improvement of the postural deformities of the feet, as it led to improved the two feet arch angles, and the Tech Gina factor for both feet and the level of the students psychological health.
Key Words:*Posture • Recreation • Knock – Knees• Flat Feet •Psychological Stress.*

Introduction

Researchers are traditionally interested in studying the human posture. Modern way of life resulted in a multitude of postural deformities, which, in turn, created an urgent need for a healthy posture. (23: 5) Posture is the result of conscious and unconscious movements, which eventually lead to the postural habits that can be responsible for lower back or lower limb deformities. (20: 3, 4)

Some of the common causes of deformities oflower limb and feet in particular are wrongpostural habits in walking, sitting, sleeping or practicing activities of daily life. Other causes include environmental, genetical and pathological factors. (20:20 – 22; 112) Bad posture has an effect on bones, joints and muscles, reducing their efficiency in functional or mechanical terms. If a deformity pertains without being addressed, bones will be

reshaped, leading to posture deformity that can be diagnosed by the use of x rays and different measurements. (14). Two common deformities are Knock-knee and Flat-feet deformity.

Knock-knees is a deformity of the legs in which the knees are abnormally close together and the space between the ankles is increased in the normal standing position as a result of having the weight bearing axis of the lateral side of the knee joint. (20: 93) (14) .It is common in children until the age of three and a half. It is too common to be considered as an anomaly. But, unless cured before the age of seven, it is considered a posture deviation, and needs to be treated by physiotherapy before it becomes a posture deformity. Weight bearing axis of the lateral side of the knee joint causes inflammation in the fibrous joint capsule of the knee. It relieves the stress on the medial node of the femoris, and increases stress on the lateral node. Therefore, the medial ligament of the knee extends (the ligament connected to the medial node of the femoris from the top and to the medial node of the tibia from the bottom), while the lateral ligament of the knee, connecting the lateral node of the femoris and the head of fibula, shortens, and becomes

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thicker than the medial ligament. Further deformity causes the tibia to rotate out from the femoris, pulling the biceps femoris and surface retractor muscle. The flexibility of the knee joint becomes more flexible and rotates further, so that the patellar deviates outward. The tibia rotates outward on the femur. The muscular fibers of some muscles working on the femoris and some parts of the quadriceps femoris shrink. So, it was deemed necessary to conduct compensatory exercises, taking these anatomical changes into consideration at an early age before calcification of the bones; and before the case turns to be a posture deformity, as the compensatory training has a positive effect on the initial deviation phase. (20: 93-95), (15), (22), (24).

Posture deformities or deviations occur in the foot and the heel just like the other parts of the body in different stages of age, and they are usually accompanied by pain in the foot, increasing with age due to weakness of the working muscles of the foot and the foot ligaments, on the one hand, and the continued abuse on the other hand. (20:16, 17), (23: 182), (16)

The flat foot is the commonest deformity due to the great burden laid on the foot in daily life. A flat foot is a condition of the feet in which the arch of the instep is flattened and the entire sole touches the ground. A Flat foot is accompanied by important anatomical changes, including:

an increase in the distance between the heel bones and navicular bones, causing the navicular bones to slide forward, down, and to medial side, affecting the tarsus, thus the foot arch is lost and the ankle bones protrude from the medial side.

Laxity and extension of foot ligaments such as the short palmar ligament, the long palmar ligament and the spring ligament.

A person with a flat foot walks in a wrong way, raising the whole foot from the ground to avoid pain (as a result of stress on the metatarsus in the normal gait), with his toes pointing outwardly. The footprint of a flat foot appears in whole on the ground and is longer and wider than usual. This is demonstrated by the Tech Gina factor scale for flat feet. Bringing the feet close together and looking at them from the back, one will notice that the two Achilles strings are not parallel, and that they point outwardly and that the medial heel protrudes. (20 : 111)

Early adolescence covers the age groups of 12, 13 and 14 years old; Scientific research suggests that adolescence is the result or outcome of the interaction between biogenetic factors, the cultural pattern and the psychological atmosphere surrounding the adolescent. The importance of adolescence is that it is a turning point in social terms. The teenager learns how to take social responsibilities and duties as a citizen in the community. Also it is a critical stage in the life of the individual because of the large number of psychological conflicts and social stresses he faces, and the choices and representations he achieves, which determine the future of his life. (10: 187)

The psychological stress is a widespread global phenomenon. It has become one of the important topics in the academic and social milieus. Psychological stress needs further research and attention. A little stress may be considered necessary, and can not be avoided in everyday life, because without stress man might appear languid and apathetic. (2), (18), (9)

 Man knew recreation in many forms since the beginning of life, and these varied and evolved through the ages until now. In our time, recreation has many forms such as physical recreation, social recreation and artistic recreation. Recreation is a social educational activity approved by the community; and it is controlled by the community customs, traditions, and the type of culture and beliefs prevailing. Recreation occupies an important place in balanced life.

The psychological objectives of sport activity concentrate – from the psychological point of view - on the person who practices a sport activity. These are: the development of desire, stimulating motivation to practice motor activity, bringing happiness to a person's life, providing him or her with recreation, self-expression, unloading emotions suppressed, achieving relaxation and psychological balance of the individual and satisfying the motive to exercise and adventure. (26: 4)

The psychological features of recreational activity are that it provides opportunities to have new experiences and a sense of security and self

importance. It also offers opportunities to satisfy the desire of curiosity, sociality, self-assertion, self-expression, imitation and simulation; provides opportunities to develop self-confidence, eliminates embarrassment, prompts happiness in achieving success, raises the level of mental health, and provides opportunities for the development of social qualities, cooperation and competition. (4: 3), (17: 4)

Purpose of the study:

1. To develop a program to improve the knock knees and flat feet postural deviations within the recreational program.

2. To identify the effect of the proposed program by measuring the improvement through the following indicators:

   a. The distance between the medial lumps of the tibia.

   b. The angles of the lateral knees.

   c. The angle of feet arches.

   d. Tech Gina factor for both feet.

   e. The level of stress in students

Hypotheses of the study

1. There are significant differences between pre and post measurements of the distance between the two medial lumps of the tibia, the angles of lateral knees, feet arch angle

and Tech Gina factor of both feet favoring post measurement.

2. There are significant differences between pre and post measurements in the level of stress for students favoring post measurement.

Research Procedures:
Methodology

The experimental method was used on one experimental sample for pre-post measurements.

Research population and sample

Ten 12-15 age students,with a knock knees deviation associated with postural flat foot were selected for the study. Care was taken to ensure that the flat feet cases studied are of the postural type, (i.e., first and second degrees), where the deviation is noticeable when standing or walking, but disappears when sitting down and lifting the feet off the ground. This was the pre-condition of electing the sample and one of the posture objective tests. (20: 113). The other test for sample selection was through asking the student to stand and bring his feet close together, and on seeing that one knee protrudes forward compared to the other. This is the most important visible sign of the knock knees deviation. Finally, it was important to ensure that the sample is free from any other postural deviations and deformities. Descriptive data of the subjects is presented in Table 1

Table (1)
Descriptive statistics for the subjects
(N = 10)

Variables		Description Significance			
		Mean	Median	Std. Deviation	Skewness
Basic	Height	151.900	152	1.595	0.201
	Age	13.400	13.5	1.174	0.041
	Weight	51.100	51	2.079	0.484
Knock – Knees	Distance between the two medial lumps of the tibia	5.280	5.2	0.397	1.413
	Angle of the right knee	167.200	167	1.135	-0.478
	Angle of the left knee	165.200	165	1.135	-0.478
Right foot	Angle of arch (degrees)	31.650	31.4	1.207	0.036
	Tech Gina factor (cm)	2.570	2.5	0.386	-0.106
Left foot	Angle of arch (degree)	30.710	30.2	1.034	0.599
	Tech Gina factor (cm)	2.940	2.85	0.263	0.323
Psychological stress scale		142.700	145	10.122	-1.123

Measurements and data collecting tools:

1. **Restameter**: to measure the total length of the body to the nearest cm.

2. **Calibrated medical balance**: to measure the weight to the nearest kg.

3. **Two-arm goniometer**: to measure the lateral angle of both knees (between the femoris and leg from the lateral side). (5), (25), (14), (20)

4. **Metal centimetric measuring tape**: to measure the distance between the two medial lumps of the tibia in the normal standing position with the knees sticking and feet spacing.

5. **Posture monitor**: to confirm the distance between the feet (as a measure of conformity with the Metal centimetric measuring tape and to emphasize the research sample is free from any postural defects or deviations in bone parts other than the deformities studied. (23: 365 366)

6. **Foot arch angle measurement**: (print of each foot separately) as indicated by Mohamed SobhiHassanein, and Mohamed Abdel-Salam Ragheb (1995),quoting McCloy and Young about the assessment of feet class of Clark, based on the notes by Safaa El-Kharbotly (2011), quoting Dimba about feet arch angle measurement and the flat factor (Tech Gina) for each foot separately to determine the flat foot factor in centimeters. This scale has achieved reliability coefficient reached 0.97. (23: 377-379), (20: 144-146)

7. **The Psychological Stress Scale**: The psychological stress scale, prepared by Nasima Ali Dawood (1995) (11), was used to measure the level of psychological stress in adolescent students. Some of its items were modified to meet the requirements of the present study. Thus, the scale consists of 52 items distributed over eight fields: the field of the school and the physical education lesson, the psychological and postural field, the relationship with parents

and siblings, the relationship with colleagues of both genders, the relationship with teachers, the economic and financial matters, emotions, feelings and fears related to practicing sport activities, and planning for the future. Opposite each item, there is a graduated scale of three scores recorded according to the Lickert method as follow: (1 = I do not suffer from this problem; 2 = I suffer slightly from this problem; 3 = I strongly suffer from this problem). Total score on the scale ranges from 52-156, where the individual degree closer to the maximum score 156 indicates a high degree of suffering from psychological stress, and the individual degree closer to the minimum score (52) indicates a low degree of suffering from psychological stress.

Scientific correlatives of psychological stress scale

A. validity: Validity was calculated in two ways:

1. **Validity of content**: for validity of the scale, the authors depended on the validity of the arbitrators, these were (5), specialized in the field of psychology, in order to determine the relevance of the phrases and elements; and the clarity of phrases. Consequently, some items were deleted, others were modified or added, based on the opinions of experts.

2. **Validity of the internal consistence**: the validity of the internal consistency was calculated through calculating the correlation coefficients between the scores of answers to the phrases and the total score on the scale.

Table (2)
Internal Consistency Coefficient
(Correlation Coefficient of the Phrase with the Total Score on the Scale), (N = 11)

Phrase number	Internal consistency	Phrase number	Internal consistency	Phrase number	Internal consistency	Phrase number	Internal consistency	Phrase number	Internal consistency	Phrase number	Internal consistency
١	0.736**	١١	0.782**	٢١	0.792**	٣١	0.827**	٤١	0.775**	__51__	**0.812
٢	0.767**	١٢	0.747**	٢٢	0.761**	٣٢	0.777**	٤٢	0.746**	__52__	**0768
٣	0.780**	١٣	0.834**	٢٣	0.806**	٣٣	0.755**	٤٣	0.740**		
٤	0.747**	١٤	0.809**	٢٤	0.812**	٣٤	0.817**	٤٤	0.825**		
٥	0.793**	١٥	0.773**	٢٥	0.790**	٣٥	0.790**	٤٥	0.757**		
٦	0.782**	١٦	0.762**	٢٦	0.822**	٣٦	0.848**	٤٦	0.833**		
٧	0.799**	١٧	0.823**	٢٧	0.791**	٣٧	0.847**	٤٧	0.743**		
٨	0.809**	١٨	0.851**	٢٨	0.798**	٣٨	0.816**	٤٨	0.765**		
٩	0.766**	١٩	0.815**	٢٩	0.735**	٣٩	0.825**	٤٩	0.742**		
١٠	0.790**	٢٠	0.861**	٣٠	0.779**	٤٠	0.834**	٥٠	0.783**		

* significance at the level of 0.05 = 0.576
** significance at the level of 0.01 = 0.708

Table (2) shows a high value of correlation coefficients, where the value of internal consistency coefficient ranged between 0.735 and 0.861. These values are significant at level of 0.01. This confirms that all phrases measure what the scale was designed to measure,

consequently, they are valid phrases and measure what they are intended to measure.

II. Reliability: Reliability was checked out in two ways:

A. Re- Test method: Reliability of the form was calculated by testing and re-testing after a 15 days period, where the first test was conducted on 02/09/2011 and the second 09/16/2011 on a sample of 12 subjects, randomly selected from the original community excluding the study sample. One form was excluded because of not completing the data required for the study.

B. Calculating reliability using the Cronbach Coefficient Alpha value: This factor is an indicator of equivalency. It gives the minimum of the estimated value of reliability coefficient of test scores; namely, the value of reliability coefficient in general is not lower than the value of Alfa coefficient.

Table (3)

The Significance of Differences between the First and Second Tests in the Total Scale and the Correlation Coefficient between the Two Tests (N = 11)

Statistical Significance / Measurement	First Test		Second Test		Differences between the Two Means		T Value	Reliability Coefficient	Alfa Cronbach Factor
	Mean	± Std Deviation	Mean	± Std Deviation	Mean	± Std Deviation			
Scale Total	113.091	10.251	113.545	9.699	0.455	1.214	1.242	0.946	0.896

* significance at the level of 0.05 = 2.22

Table (3) shows that there are no statistically significant differences between the first the and second tests. The calculated (T) value was 1.242. This value is lower than the tabular (T) value at the level of 0.05. The correlation coefficient (reliability coefficient) between the two tests was 0.946. This value is a good indicator of reliability of the form in case of re-test. The Alfa coefficient was 0.896. This value is significant at the level of 0.0**1,** which refers toreliability of the scale. The value of Cronbach Coefficient Alpha confirms that the phrases are homogeneous, compatible and, together, they represent the scale structure. It also shows that any deletion of or addition to any phrase could have a negative effect on the scale structure.

8 - The proposed program:

To design the proposed program, a referential survey of similar studies and researches was made. Objectives of the program were determined, the target category was identified, the program was designed in its preliminary form and presented to experts in the field of posture and recreation (N=5). This resulted in come by modifications, deletions of and additions to a number of exercises and phrases. The program content was sub-divided into 24 units distributed over 12 weeks, at the rate of two units per week. The time allotted for each unit was 45 minutes. After the changes required were made, the program was ready for test in its final form.

Pilot study

The pilot study was conducted in the period between 28/8/2011 and 17/9/2011 on a sample of 11 students meting the same slection criteria, but excluding the latter in order to:

a - provide measuring devices used, and psychological stress scale, as well as the devices used in the recreational postural program; and to confirm and calibrate their competence. b − Do the preliminary experimentation of the program.

Basic study:

The pre-post measurements of the research as well as the recreational postural program were

conducted in a period of four months from 18/9/2011 to 19/1/2012.

Results:

Table (4)
Significance of the Differences between the Pre-Post Measurements
of the Knock - Knee Variables (N=10)

Statistical significances / Variables	Pre-measurement		Post-measurement		Differences between two means		T Value	Improvement (%)
	Mean	± Std Deviation	Mean	± Std Deviation	Mean	± Std Deviation		
Distance between two medial lumps of tibia (cm)	5.280	0.397	3.640	0.698	1.640	0.406	*12.772	31.061
Angle of the right knee (degree)	167.200	1.135	173.700	2.584	6.500	2.718	*7.562	3.888
Angle of the left knee (degree)	165.200	1.135	172.100	2.846	6.900	2.644	*8.254	4.177

* significance at the level of ٢.٢٦ = ٠.٠٥

Table (4) shows that there are differences between the two measurements favoring the post–measurement, where the calculated (T) value varies between 7.562 and 12.772. This value is significant at the level of 0.05.

Table (5)
Significance of the Differences between the Pre-Post Measurements
of the Feet Deformities Variables
N = 10

Statistical Significances / Variables		Pre–measurement		Post–measurement		Differences between two means		T Value	Improvement (%)
		Mean	± Std Deviation	Mean	± Std Deviation	Mean	± Std Deviation		
The Right foot	Arch angle (degrees)	31.650	1.207	36.800	1.989	5.150	1.524	*10.686	16.272
	"Tech Gina" factor (cm)	2.570	0.386	1.500	0.377	1.070	0.226	*14.950	41.634
The Left foot	Arch angle (degree)	30.710	1.034	35.040	2.069	4.330	1.801	*7.604	14.100
	"Tech Gina" factor (cm)	2.940	0.263	1.650	0.470	1.290	0.307	*13.282	43.878

* significance at the level of ٢.٢٦ = ٠.٠٥

Table (5) shows that there are differences between the two measurements favoring the post–measurement. The (T) value varies between 7.604 and 14.950. This value is significant at level of 0.05.

Table (6)
Significance of the Differences between the Pre-Post Measurements in the Total Score of the Psychological Stress Scale
N = 10

Statistical Significances Measurement	Pre–measurement		Post–measurement		Differences between two means		T Value	Improvement (%)
	Mean	± Std Deviation	Mean	± Std Deviation	Mean	± Std Deviation		
Measurement Total Score	78.700	18.264	64.000	27.817	142.700	10.122	*٧.٢٧٦	٤٤.٨٤٩

* significance at the level of ٢.٢٦ = ٠.٠٥

Table (6) shows that there are differences between the two measurements favoring the post–measurement. (T) value was 7.276. This value is significant at the level of 0.05.

Discussion of the results

Table (4) shows that there are significant improvements in measured variables due to exercise program. The highest improvement percentage occurred in the distance between the two medial lumps of the tibia (31.061%), followed by the improvement percentage of the left knee angle (4.177%). The lowest percentage of improvement occurred in the right knee angle (3.888%).

Table (5) shows that there are differences between the two measurements favoring the post–measurement. The highest improvement percentage of "Tech Gina" factor occurred in the left foot (٤٣.٨٧٨%), followed by "Tech Gina" factor for the right foot with improvement percentage of 41.634%, followed by the arch angle of the right foot with improvement percentage of 16.272%. The lowest improvement percentage (14.100%) occurred in the arch angle of the left foot.

It is obvious from the above presentation that the proposed program has led to an improvement in the posture deviations addressed in the present study. The results of the study are in accordance with the findings of Abd El BasetSeddik (1991) (1), Better (2004) (3), Yehia El Haggagy (2006) (27), and Nasser Mardy (2009) (12). These all confirmed that some posture deviations can be improved by using standardized and directed compensatory exercises.

The authors of the present study attribute these results to the proposed program, which took into consideration suitability to the nature of the research sample. Introducing a spirit of fun and performing the compensatory exercises in the form of competitions also led to raising the morale in the research sample , which in turn of the research sample into a motive which positively contributed to the improvement of the posture deviations addressed in the study. Progress in applying the program was also the result of the students regularly attending and exerting effort which involved participation of the working muscle groups during the performance. Students trained regularly twice a week doing 24 units for 12 consecutive weeks. This has had a positive effect in making progress in taking the post measurements.

The authors attribute the significant differences favoring post– measurements shown in Table (4) to the type of therapeutic compensatory exercises which focused on lengthening the working muscles and ligaments on the lateral side of the knees, shortened and shrunk because of the postural deviation, and, consequently strengthening the muscles and ligaments on the medial side of the knees. As a result of correcting the wrong posture position in the femurs and legs, there is an improvement in the

right and left feet arch angles as illustrated in Table (5), and an improvement of the Tech Gina factor in both feet, which is shown by the significant differences favoring the post-measurements. The compensatory exercises designed for flat feet, which focused on lengthening the shortened muscles such as the tibialis, as well as strengthening the lengthened muscles such as the peroneals(19: 226 - 263).

Table (6) - that shows the differences between pre-post measurements in the total score on the psychological stress scale- shows that there are differences between the two measurements favoring the post–measurements. The improvement percentage in the total score on the psychological stress scale was 44.849%.

It is clear that the proposed program has led to an improvement in the level of psychological stress of the students. These results are in accordance with the findings of Hultsman (١٩٩٦) (6), Passmore&Frensh (2001) (13), JesepMahony (2004) (8), Samir Khalaf Jerry (2008) (21), Nagy Ishaq (2011) (7), who confirmed that practicing recreational activities lead to blunting stress and nervous tension caused by modern life, and achieving relaxation and psychological satisfaction, thus achieving individual psychological balance.

In this regard, Mohammed Alhamahmy and Aida Abdel-Aziz (2001), refer to the contributions of recreation to the life of contemporary societies, where recreation helps to achieve human needs of creative self–expression, getting rid of psychological stresses and nervous tension caused by modern life, and providing a personal and familiar life full of happiness and stability (10:34).

The authors believe that the results of he study have a high significance, and that the improvement percentage was positive. The researchers attribute this to the recreation program which brought the spirit of fun, competition and happiness to the subjects. Thus, inclusion of such programms could be recommended.

Conclusions

In summary, the following conclusions could be drown:

1. The proposed program has led to an improvement of the posturaldeformities of the knock-knees, as it led to improving the distance between the two medial lumps of the tibia and the two angles of the lateral knees.

2. The proposed program led to an improvement of the posturaldeformities of the feet, as it led to improve the two feet arch angles, and the Tech Gina factor for both feet.

3. The proposed program led to an improvement of the level of the students psychological health.

   Thus, inclusion of such programms could be recommended.

References:

1. Abd El BasetSeddik: The Impact of Rehabilitation Program on Flat Foot degrees, unpublished doctorate dissertation, Physical Education College for males Faculty of Physical Education for Boys, Alexandria University, 1991.

2. Agolla, Joseph: An assessment of academic stress among undergraduate students: The case of University of Botswana Educational Research and Review Vol.4 (2), pp, 063-070, 2009.

3. Better, U: The best abdominal Exercises you have heard Of. Grey Lake Inc. Box 342 Illinois USA,2004.

4. Dale mode, et. el. : Sports and recreational activities , 12ed , Mcgraw – ill,1999.

5. Green Field J. A.,: Tow new geniometer knee and elbow orthoses. http://www.uhs1.comp/goni.htm1,1990.

6. Hultsman, Wendy : Recreation participation During Early Adolescents- Perspective on what's Gained and lost leisure Research Symposium, Octobers, 23 – 27, Kanasa city, 1996.

7. Ishaq Nagy: Facing psychological stress skills for those who have learning backwardness, unpublished doctorate dissertation, College of Arts, El-MinyaUniversiy, 2011.

8. JosepMaoney; et. el. : Unstructured youth recreation centre participation and antisocial behavior development Selection influences and the moderating role of antisocial peers, International Journal of behavioral development, November, 2004, vol,28, no,6.

9. Libby,B: Understanding and Managing Stress in the Academic World, ED291017,1987.

10. Mohammed Alhamahmy, Aida Abel-Aziz: Recreation between theory and application, edition 42, Cairo, Alkitab for publishing, 2001.

11. Nasima Ali Dawood: Stresses of Students from sixth to tenth class in Jordan school, and their relation to learning, gender and class, Studies, (human sciences), Jordan University, 1995.

12. Nasser Mardy: Proposed Training Program for treating Flat Foot for elementary school students in Kuwait, unpublished Master dissertation, Banha University, 2009.

13. Passmore, Anne and DavinaFrensh :Developpement and Administration of a Measure to Assess Adolescents participation in Leisure Activities Scool Occupational Therapy. Curtain technology Bentley , western Australia, 2001 .

14. Paul Esposito, M. D.,: Pediatric orthopedics, 1999, http://www.unmc.edu/pediatries/m31ecture s/handouts/ortho.htm

15. Peterson: Orthopedics/ bowlegs and knock knees,1999, http://www.ccmekids.org/departments/orth opadics/orthoed15.htm.

16. Pryce: flatfoot,1999http://www.flatfoot.com/.

17. Richard, et. el. :Recreational Sport Mangement 3ed, Human Kinetics,1997.

18. Ross, E, Niebling, B, and Heckert, T. : Sources of Stress Among College Students. College Students Journal, June,1999.

19. SafaaSafaa El-Din Elkharbutly: Angular Change of Knees and Feet accompanied Knock Knees in age group 12-15, theories and applications of a scientific magazine specialized in sports and physical education studies and researches, Physical Education College for males, Alexandria University, n 40, 2001.

20. SafaaSafaa El-Din Elkharbutly: posture Fitness and Massage, second edition, Dar El-Gam'een for publishing, Alexandria, 2011.

21. Samir Khalaf jerry: The Impact of an open recreational method on relieving psychological stress of students inhabit in internal divisions, unpublished Master dissertation, Physical Education College, University of Basrah, 2008.

22. Sharron E. Ross: Bowlegs & knock knees. http://www.chw.edu.au/parents/factsheets/b owlegsj.thm.

23. SobhiHassanein, and Abdel-Salam Ragheb: Healthy Posture for All, first edition, Dar El-Fekr El-Arabi, Cairo, 1995.

24. Tampa. R. D.,: Your child has been diagnosed with knock kness. http://www.orthoseek.com/articles/bowlegs. kk.htm1.

25. Thomas, R. Lunsford: Tools for evaluating the physiotherapy and the occupational, goniometer with arms, 1999. http://www.plastidb.it/uk/strumentimedici.h tm

26. Yarlagadda, et. el.: Methods of teaching physical education, Discovery Publishing house , New deli ,2004.

27. Yehia El Haggagy: The Impact of Therapeutic Exercises on Flat Foot of Students age group (9-12) in Nalut District, unpublished Master dissertation, Physical

Education   College,   Seventh   of   April   University, Libya, 2006.