Determination of Knee Alignment Index (Genu Valgum & Genu Varum) in Deferent Age's Group for Women in Mazandaran Province

[1]Reza Rajabi, [2]Hamideh Gorjian, [3]Seyed Hasan Hashemi Tabar

[1]Assistant professor in Physical education, Tehran University, Teharn, Iran
[2]Master of Bachelor in physical education, Tehran Payame-noor University, Noor, Iran
[3]Master of Bachelor in physical education, Mazandaran University, Noor, Iran

A R T I C L E   I N F O

A B S T R A C T

Background: The object of this study is Determination of knee alignment index (genu valgum & genu varum) in deferent age's group for women in Mazandaran province. **Objective:** In this regard, we have selected 300 teste randomly among peoples by health lower body structure, in geographical region of 5 in Mazandaran (north, south, east, west and center) and 5 different age levels of 9-14, 15-24, 25-44, 45-64, and 65 years old and higher has been tested. In this study, according to knee examination Performa in genu valgum & genu varum knee examination, we have used of intermalleolar distance and intercondylar distance. The basic examination instrument is: Verner caliper made up of USA by 0.02 mm exactness and side instrument includes: transformed caliper and scaled blade of internal measurement. Datum' analysis has been done by emphasis on determining the mean and standard deviation in age groups and confidence interval of 95% by the aid of SPSS18 software. **Results:** Based on study findings, IM.IC index for Girls 9-14 years old is -0.12 ± 1.34 cm. IM.IC index for boys in 15-24 years old is 0.22 ± 1.39 cm. IM.IC index for the men in 25-44 years old is -0.47 ± 1.52 cm. IM.IC index for the men in 45-64 years old is -0.91 ± 1.83 cm. IM.IC index for the men in 65 years old and higher is 1.37 ± 2.31 cm. Conclusion: The result showed overall suggest that in women increases with age over the course of a normal knee genu valgum & genu varum knee.

INTRODUCTION

Body status is same alignment of different parts of body to each other. When a person does have feasible status , his body alignment would be balanced as to decrease pressures on his different part of body, instead when he has weak body status, because of higher pressure to different parts of body, his body alignment would exit from equilibrium and this continuous pressure, if became out of balance, if this continuous pressure be low, would lead to non- anatomic adaptability, these changes would change people ability in doing works and is influential on the whole body efficacy [3]. While emergence of abnormality in different parts of body is influential on its movement amplitude, therefore in order to evaluate status abnormality require measure and standard in which recognize people body condition [1]. From sport creational view, any change in body natural alignment especially in lower part of body is some type of abnormality [4]. Muscular skeleton abnormality would emerge in different part of body and its basic cause is putting body in a situation in which is not natural and in long term. The most part of body in which is in exposure of abnormality include body (neck spinal column, back and waist) and lower part of body. Prevalent abnormality of lower part of body include cross and bracket knee in which both of them are some type of disorder in natural alignment of knee. In this regard, finding influential method for decreasing abnormality in lower part of body and its side effect are always the researchers' mental disturbance. We would recognize natural level and limit of these abnormalities to be the base of naturalist or non-naturalist of lower part of body.

There are so many studies in and out of Iran about evaluating knee posture. In researches of Mohammadi (1994), Vakili (1995), Heidary-nik (2007) shows high level of lower part of body abnormality especially among girl and boy students [6, 8, 18]. The examination of these studies shows the amount of body abnormality

Corresponding Author: Hamideh Gorjian, Tehran Payame-noor University, Physical Education, Box.4718777658. Noor. Iran.
Tel: +989361434274   E-mail: hamideh.gorjian@yahoo.com

prevalent especially calf alignment (genu valgum & genu varum) is high in Iran. Penha *et al* (2005) has evaluated girls posture from 7-10 years old" in which among 132 girls in four age level has been evaluated, high level of status abnormality has been reported in school years and some of them would be corrected in growth naturally and some of them remain as lower part of body abnormality [13]. According to the topic, cross knee frequency is 64% more than other abnormalities in lower part of body. Also, in Cahuzac *et al* (1995) study by the topic of completing clinical angle of tibiofemoral in health youth among girls and boys, distance on intermalleolar is less than 4-8 cm and intercandylar distance is less than 4-5 cm has been reported [2]. In Yoo *et al* (2008) study in completing knee angle on 452 Korean children from 1-15 years old, showed general pattern in knee angle change is the same in Asian and European children. He showed change in knee anatomic angle in three groups: in the first stage (1-4 years old) change in calf alignment reaches from 1 various to the maximum valgus ratio. The second stage (5-8 years old) the amount of valgus has decreased and in third stage (9-15 years old) calf alignment is the same as adult pattern [19]. At last they reported this natural information has been recognized in continuous change in knees' angles on children lower part of body. In this study, in order to evaluate knee angle for evaluating ganovarum and ganovalgum, we have used of whole height graphs of anterior-posterior.and also, Omololu *et al* (2003) has studied 2166 children from 1-10 years old and showed knee are arched in 1-3 years old and naturally decreases 0degree.in the two genders after 7 years old in boys, calf was not arched [11]. The amount of knee angle from 1-10 years old in the two genders was 10degree fixed. The mean IC distance was 0.2cm in 1years old and there is no meaningful difference to 10 years old. The most distance of IM among 2-4 years old is reported 2.5-2.2 cm.

Pamela & Ghinwa (2003) has examined children's lower part of body abnormality and found there is always turning and angle problems in lower part of body abnormality in children (internal and external leg claw) and some angle problems including arched leg and X leg in which would be corrected in the most parts and if it have has 3-4 unit of standard deviation from natural limit, it requires surgery [12]. Also in Tradowsy (1990) study by the topic of gender difference in IC distance on 130 men and 130women showed there is meaningful difference among IC distance of men about 108 mm and women 102 mm (p<0.001) (17). in another research, Nguyen *et al* (2009) has determined the relation among lower part of body alignment and Q angle on 218 men and women and has resulted Tibiuofemoral and ant version femur angle (spontaneously) are of meaningful estimators of Q angle in the two genders [10]. Although, in internal and foreign studies, almost researchers has mentioned to cross knee and bracket one abnormality by high statistics, but none of them has mentioned to the mean or limitation as an alignment and natural angles of lower part of body. Therefore, it is not clear apprehensive statistics of above studies was based on what basic for evaluating abnormality, because in fact these researchers does not have natural number or limit of those curvature for recognizing lower part of body abnormality and there is no study about preparing lower part of body index yet. Also, the have used of visual measurement instrument like plummet line, and New York body situation chart. It is obvious; Researchers could not have high confidence to the result against quantifiable instrument measurement like Ben caliper, caliper, x radiography. We should mention, is result of (genu valgum & genu varum) from natural limit study or non-natural amplitude? Researchers could answer to the question when variables' index and standard be determined in research society.

Methodology:

Current study is of descriptive one according to the content of topic and has been done in field. Statistical society of research includes women in Mazandaran province by health structure of lower part of body. Tastes has been evaluated in 5 age level of 9-14, 15-24, 25-44, 45-64, 65 and higher. The basic of age categorization is age according to the principle of international standard categorization. Samples include 300 persons in which has been selected randomly from all geographical regions of Mazandaran (north, south, east, west) in any region 60 persons and from any age groups 12 teste and in general has been selected 60 persons. In general, we have selected 300 women and girl for this study. None of them have has past record of lower part of body disease (Steomalasi, Steoartherit, Traumatism) nerve-muscular, capsule and outer ligament cut, surgery/traumatic disturbance/ breakdown/burning in lower part of body, natural deformity in lower part of body, obvious ach in lower part of body in examination and long term physical activity and membership in professional sport team. The basic instrument of evaluation was caliper Verne made up of USA by 0.02 mm exactness (figure 1) internal measurement calibrated ruler made up of Shinwa company in Japan by 0.01 millimeter exactness (figure 2) changed caliper (figure 3). We have put teste without shoe and socket and by naked knee and lower part of femur against tester easily and on plane surface and upright standing and legs parallel next to each other without tolerating any contraction and non-natural tension in femur muscular. While intercandylar distance and intermalleolar are in the least distance from each other in natural mode and heap and knees are in the whole extension [5]. In order to evaluate IC, IM distance, we determined intermalleolar and intercandylar distance of calf. In this regard, we selected internal part of femur, upper part of knee joint, the greatest and the smoothest saliency by back tendency as intercandylar distance and internal saliency of lower part of tibia on upper part of ankle as intermalleolar distance [7]. Then we measured the distance among intermalleolar and intercandylar of

ankle by caliper. We computed measures and the means 2 times. Because there was not any instrument to measure distances among intermalleolar and intercandylar of ankle in country, researcher has selected the best instrument. We should mention because the length of internal measure of head mover caliper was short and obstacle the touch of caliper branch let to condyle and malleolar from anterior view, researchers has used of auxiliary instrument like internal measure calibrated ruler, changed caliper after consulting to an industrial group. At last, the distance has been put on caliper and numbers has been computed.
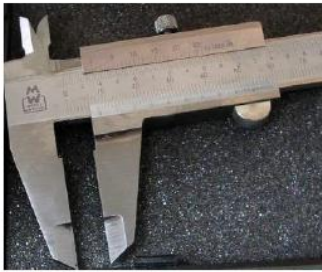

Figure1. Vernie caliper, size has been got from changed Caliper

Figure2. Internal measure calibrated ruler for measuring distance less than 16 mm.

Figure3. Changed caliper for measuring distance more than 15 mm in which would be read by caliper at last.

We should mention there was no any pressure from researcher in measuring stature. The distance was measured from skin to skin. Teste has got order and researcher has touched stature and points of intermalleolar and intercandylar distance and signed by pen and then determined them by ruler and caliper (Figure 4, 5 ,6, 7) and at last has been read by caliper (Figure 8, 9). In general, we could say study results are of real number. Now, the amount of ankle varus and valgus has been evaluated by IC, IM distance. IC and IM distance measuring shows the same procedure by high correlation coefficient in touching condyles and malleolar [15]. This relation shows, we could use both of them for proving situation and controlling complication progress. Clinical measure of IM, IC distance is a cheap, simple, fast, reliable, and non-aggressive for determining lower part of body alignment [14]. Especially, this method is feasible to culture, society, and our religion in Iran and there is no need to expose our leg wholly.

Figure 4. The method of measuring IC distance

Figure 5. The method of IC distance measuring

Figure 6. IM distance measuring method

Figure 7. IM distance measuring method by internal measuring ruler & changed caliper

Figure 8. Measuring method of distance from changed caliper

Figure 9. The distance less than16 mm in which has been compensated by internal measure ruler

While current study is determining intermalleolar and intercandylar distance for special society, then the basic statistical method is by emphasis on mean determination for considered age and their standard deviation. In this case, we have used of mean and confidence interval computation equal by 95% and by SPSS$_{18}$ software.
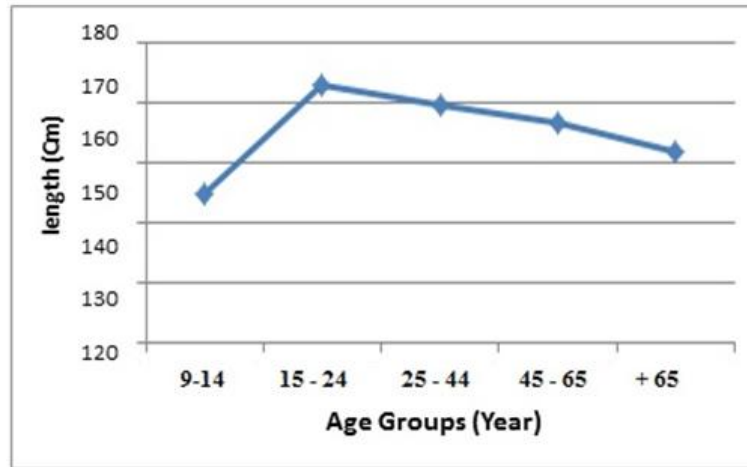*Results:*

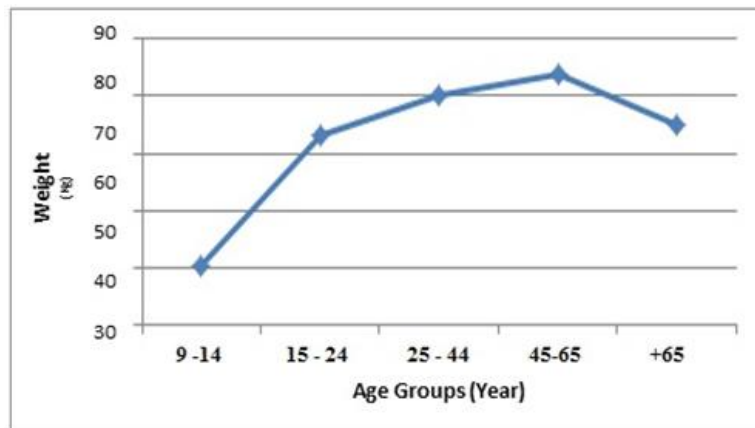**Chart 1:** Average height, by age group:

Chart 2: Average weight according to age group

While our study object is to achieve men society index by IM, IC variables in Mazandaran, therefore it require providing general information about these two variables to users. In this case, we considered natural ankle alignment as there was not any distance among intermalleolar and intercandylar distance, natural amount is 0 for the two variables of IM-IC. In this case, we define an index in which consider knee and ankle and one data is natural that there was IM and IC zero. We decrease the amount of IC from IM and reach to a variable by the name of IM.IC in which anybody by zero IM and IC , it means does have natural calf alignment and his knee is not cross or bracket and as a result the amount of IM.IC would be zero. When there is distance among femur condyles and hump were jointed, does have negative IM.IC. As a result, in this study we have used of IM.IC index for determining calf alignment in different level of men in Mazandaran province. We tried to provide required information by details in the firm of table and chart.

Table 1: IM.IC index in different range of ages .

min	max	Standard deviation	mean	variable	number	Age group
- 3.81	3.18	1.34	-0.12	IM.IC	60	9-14
- 3.47	4.28	1.39	0.22	IM.IC	60	15-24
- 6.69	3.44	1.52	-0.47	IM.IC	60	25-44
- 6.38	2.76	1.83	-0.91	IM.IC	60	45-64
- 3.11	6.38	2.31	1.37	IM.IC	60	+65

Discussion and conclusion:

Although in foreign and internal study, researchers has mentioned to the high level of genu valgum & genu varum abnormality, but none of them has mentioned to the mean or limit as alignment and natural angle of

lower part of body. Therefore, it is not clear how are measured the apprehensive statics of those researches, and there is no study about preparing lower part of body index. Mokhtari has examined IM and IC factors separately, but researcher has studied them blending. (in research findings, we mentioned to the method of evaluating IM,IC index) while Mokhtari has measured samples from anterior or caliper and researcher from posterior and by changed caliper and internal measure calibrated ruler and at last caliper, we have reached to the same result [10].

Mokhtari s' general result: men IC is more than women and women is more than men researcher based on table1 in age level of under 14 , about 90% of samples are in normal range, but in 15-24 years there is outstanding increase in IM.IC index (genu valgum). In age level of 25-44 there is increase in IM.IC index (genu varum). In age level of 45-64 there is continues to decline in IM.IC index (genu valgum) has been maintained. In the last age group, (65 and higher) there is saw an increase in ejection in IM.IC index fron genu varum to genu valgum. According to the chart point 3. Women generally show that increases with age over the course of a normal knee genu valgum & genu varum knee.

We could use of it in recognizing calf abnormality (genvarum and geno valgum) in women and also in different age groups in Mazandaran province. At last, we suggest in order to spread apply of index and preparing general norm gram of calf in country, would be done the same research in other provinces and other gender, too. Also, we would consider the influence of different geographical region and climates in IM-IC distances. Overall suggest that in women increases with age over the course of a normal knee genu valgum & genu varum knee.. Preparing index requirements include: 1.evaluating by the aid of standard index 2. Economically profitable 3. Having situation index of a society clears its status to other societies. Evaluating abnormality would prepare the possibility of comparison, judging any action in the ground of quantity and quality improvement of peoples, because we could provide a measure for society and evaluate different sections of society and recognize the weakness and advantages of it and the compare them.

This study could provide valuable information to Mazandaran health and treatment center and other researchers to get general norm gram for Iran society. This index could be used for recognizing calf abnormality (genu valgum & genu varum) in women section and also in different age groups in Mazandaran to evaluate and recognize early and avoid progress of abnormality prevalent in lower part of body and the bringing up health society.
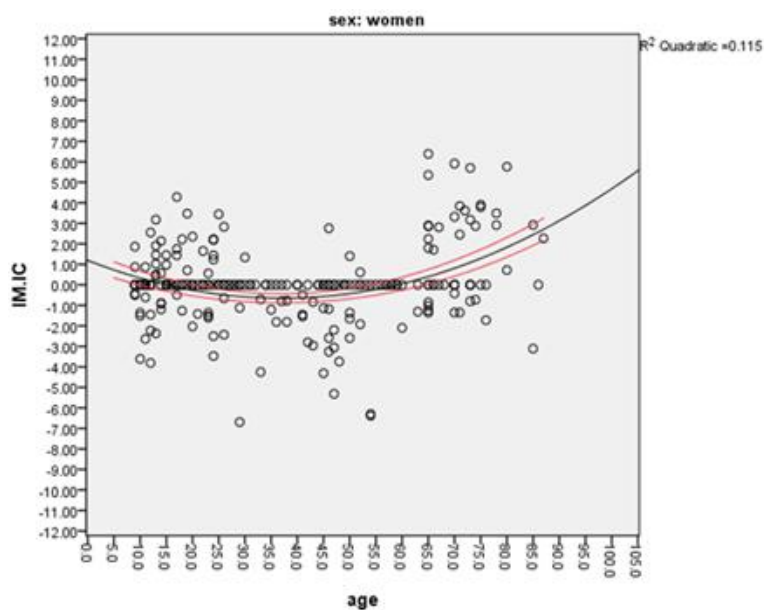

Chart 3: Point chart of IM.IC by 95% confidence interval.

REFERENCES

[1]   Bigdeli, L., 2006. Determining the genu varum outbreak in the youth 15-35 years old in Chamran hospital from 2003-2005. Professional doctorate thesis, Azad University, Tehran medical unit.

[2]   Cahuzac, J.P., D. Vardon, J. Sales de Gauze, 1995. Development of the clinical Tibiofemoral Angle in Normal Adolescents. A study of 427 normal subjects from 10 to 16 years age. J Bon Joint surg Br., 77(5): 729-732.

[3]   Daneshmandy, H., F. Rahmani-nia, L. Zobeiry, 2005. Determining the status of boy student weight and its relation to lower part of body abnormality. International conference in sport science of Caspian Sea shore universities, Gilan university publication.

[4]   Daneshmandy, H., M.H. Alizadeh, M. Moghadasi, 2007. Determining knees' natural alignment and its relation to some influential factors in professional athletes. Olympic seasonal magazine, 14(1): 41-50.

[5]   Daneshmandy, H., MHM. Alizadeh, R. Ghrakhanloo, 2006. Correction movement, recognition and practices prescription, Tehran, Samt publication, physical education and sport science research institute, third publication.

[6]   Heidary-nik, H., 2008. Examining bodily abnormality of students in guidance schools of kimjan city, PH.D thesis.

[7]   Hinkel, K., 2005. Anatomy and movement principle, Samt publication, third publication, pp: 98-157.

[8]   Mohammadi, R., 1994. Examining the type and the amount of knee change outbreak and its relation to damages on these joint and different posts in football players in Isfahan super league. M.D thesis, physical education college, Tarbiat Moallem university.

[9]   Mokhtari, G., 2009. Preparing lower part of body alignment index (genu valgum & genu varum) in men and women of Hamedan city. M.D thesis, Tehranr Payame-Noor University.

[10] Nguyen, A.D., M. Boling, B. Levine, S.J. Shultz, 2009. Relationships Between Lower extremity Allignment and the Quadriceps Angle, Clin J Sport Med, 19(3): 201-206.

[11] Omololu, B., A. Tella, S.O. Ogunlade, A.A. Adeyemo, A. Adebisi, T.O. Alonge, S.A. Salawu, A.O. Kinpelo, 2003. Normal Valgues of Knee Angel, Intercondylar and Intermalleolar Distances in Nigerian children, West Afr J Med, 22(4): 301-304.

[12] Pamela, M.D. and M.D. Ghinwa, 2003. Lower extremity abnormalities in children. American family physician, 68(3): 461-468.

[13] Penha, P.J., SM. Amado, R.A. Casarotto, C.J. Amino, D.C. Penteado, 2005. Postural assessment of girls between 7 and 10 years of age. Cliniss, 60(1): 9-16.

[14] Provisional Guidelines of Standard International Age Calssification, available at: http://unstates.un.org/unst/publication/seriesM-74e.pdf.

[15] Qureshi, M.A., M.B. Soomro, I.A. Jokhio, 2000. Knee Angel Development in Karachi children, A clinical assessment by measuring tibia length & Intercondylar or inter malleolar distance, Professional Med J, 74: 482-491.

[16] Schunke, M., E. Schulte, L.M., Ross, V. Schumacher, E.D. Lamperti, 2005. Thieme Atlas of Anatomy: General Anatomy and Musculoskeletal System, pp: 362-363.

[17] Tradowsy, M., 1990. Sex Difference in Intercondylar Distance, J Prosthet Dent, 63(3): 301-302.

[18] Vakili, F., 2005. Examining and comparing the situation and girl lower part of body change in physical education field, M.d thesis, physical education college, Tarbiat Moallem University.

[19] Yoo, J.H., I.H. Choi, T.J. Cho, C.Y. Chung, W.J. Yoo, 2008. Development of Tibiofemoral Angle in Korean Children, J Korean Med Sci., 23(4): 714-717.