IJBPAS, January, 2016, 5(1): 306-318

ISSN: 2277–4998

International Journal of Biology, Pharmacy and Allied Sciences (IJBPAS)

'A Bridge Between Laboratory and Reader'

www.ijbpas.com

ERGONOMIC STATUES OF WORKPLACE &ANTHROPOMETRIC MEASUREMENT OF ISLAMIC AZAD UNIVERSITY SHIRVAN BRANCH EMPLOYEES & ITS RELATIONSHIP TO PHYSICAL ABNORMALITIES

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ABSTRACT

Background: Ergonomics or human factors engineering is practical knowledge that compounds basic sciences that try to creating proper characteristics between human [physical-mental] & his abilities & workplace designing tools, machines workplace.

Objective: The purpose of this study is to compare the Ergonomic statues of workplace & anthropometric measurement of Islamic Azad University Shirvan Branch employees & its relationship to physical abnormalities

Results: The statistics showed that there is direct & meaningful relationship between weight [Kg] & height [cm] in the $P<0.05$ & confident coefficient 95% The statistical surveyed showed that there is inverse relationship between length [cm] & high [cm] of seat in $P<0.05$ & confident coefficient 95%.The statistical surveying showed that there is meaningful relationship between the difference of employees' seat & desks height with standards ones in p <0.01 level with confident coefficient 99%The statistical surveying showed that there is direct meaningful relationship between weight [Kg] & the amount of fat percentage in $P<0.01$ & with confident coefficient 99%, Statistical surveying showed that there is direct meaningful relationship between fat percentage & lumber lordosis disorders in $P<0.01$ level & confident coefficient 99%, Statistical surveying showed that there is direct meaningful relationship between fat percentage & raised abdominal disorders in $P<0.01$ level & confident coefficient 99%,. Conclusion: Analyzing the results showed that desks & seats dimensions of university

is shorter than normal regarding to the employees' height & seats are shorter than normal size. So, these reasons caused to making skeletal-muscular problems & then caused to decreasing employees' efficiency because of disproportion between desks & seats with employees' body dimensions are against of posture principle [Reneh, 1988] & then caused to employees face to muscular-skeletal problems, when the seat height is shorter than normal caused to creating back kyphosis & stretch stress on posterior spine & then creating pain & if seat doesn't have elbow or back is vertical caused to pressures on disk & back. If the height of desk is shorter than normal caused to neck & head bent & due to the pain in neck. Also coming to forward of shoulders caused too rounded shoulder & pectoral muscle be short & posterior muscles of the shoulder girdle placed under tension & if the desk is higher than normal than body dimension caused to continuous contraction of lifting muscles of scapula [Levator scapulae muscle] & upper trapezius muscle & then caused to face many problems in muscle & if the height of seat is so much, the feet suspended in the air & calf muscles like twins & soleus were shorter in length & are prone to conflict. Against it low of seat height than body dimension person sitting must bent his/her knee so much & must keep it in this situation that may witness the cont involvement quadriceps & lumber kyphosis.

INTRODUCTION

Ergonomics or human factors engineering is practical knowledge that compounds basic sciences that try to creating proper characteristics between human [physical-mental] & his abilities & workplace designing tools, machines & workplace. Ergonomics science formed with the goal of maximizing productivity regarding to the health, safety & welfare in workplace ergonomics are obtained by studying on human abilities & conditions, workplace stress, familiar with human body static & dynamic forces caution, tool design & learning for human supporting along with respect to the principle of ergonomics caused to decrease the under fatigue & occupational pressure. So, theefficiency will be increased & finally can say if respect to these principle, workers & employers' interests will be obtained.

Ergonomics means a scientific studying on relationship between himself & workplace. Ergonomics measures & evaluates the human ability & so helps engineers & designers to designing better systems & progresses that be proportion with human characteristics [7]. Ergonomics is along with evaluating human abilities & limitations [Biomechanics

anthropometry], occupational stress & workplace stress [work physiology & industrial psychology], static & dynamic forces on human body [biomechanics], caution [industrial psychology, fatigue [work physiology], designing & the work & tools station [anthropometry & engineering]. Ergonomics science studies on following 4 domains:

Engineering psychology:

In first domain, engineering psychology, are surveyed the different aspects of data processing related to the work. This domain of ergonomics is considered as designing work methods with goal of decreasing accidents caused by human errors based on occupational health & safety perspective.

Work physiology:

In second domain, work physiology, studies on body metabolism & energy exchanges & also is analyzed the concept of fatigue, dynamic & static works & regime & work rest are surveyed based on physiological work points of view.

Occupational biomechanics:

Mechanical properties of body organs are surveyed on occupational biomechanics discussion & also analyzed limb movement & forces in different body tissues. By this equations can be obtained proper model & dimensions of working place with the goals of decreasing external mechanic pressures & forces on body. Briefly can say what the force transmission & moved the tools & objects are kinds of occupational biomechanical discussion

Anthropology:

1- Measuring the physical dimensions & usage of dimensional data in physical conditions correlation of workplace & positions. Since one of the reasons of pressures on body organs are nonoccurrence of workplace dimension with workers & users' body dimension conditions, entropy data can be used effectively in designing equipment & work situations & places, tools & products [13]

1- Ergonomics' healthy aspects include;

- Preventing unwanted diseases & disruptions & absenteeism from work station.
- Best use of power of work efforts
- Best use of resources & workers' capabilities.

2- Ergonomics' economic aspects include;

- Optimum use of energy & power that caused to more efficient
- Regular work & rest that caused to increasing productivity.
- Eliminate fatigue that caused to improving quality of work

The world of childe in house includes school & societies around him/ her. These places

must be safe & health, but experiences showed that these places due to the many phenomenon & many diseases [9]

When the safety of schools face to dangerous caused to the accidents & phenomenon, wound & death among students & if don't pay attention to the ergonomic criteria, caused to create skeletal & muscular fatigue & discomfort able [11], posture in childhood that it is the most important factor in growth of spine & senior conditions on it, that in adulthood due to the back pain. These pains are along with pain or without it or with worried. Some studies reported the relationship between neck pain, back pain & school facilities.

The discrepancy in knee high or length & desk length are leading to the shoulder & neck pain. Posture is another problem factor that related to the back pain.

Balague [4] &Trojher [23] showed that among children who have back pain in school, their pain will be increased with long time sitting. They knew that 23 percents of children experienced back pain in posture & this pain continue with increasing sit in school, when the seat is too deep, the front edge of the seat compresses the dorsal surface of knee & legs & cut off the circulation path in legs & he/she for reducing the pain & discomfort able come to the front of seat & the rear [back] of seat will be heavy & then caused to he/she falls down & then causes to increasing pressures & excessive swelling & pain in the back bone. Also, if a seat is shallow & short causes the user feel falls down to the front of seat. So, avoids this happen a person down his/her thighs to keep him/her.

SirusChobineh, relationship between abdominal muscles & pelvic flexibility of Suez, with lumber lordosis in 20 Physical Education students aged 19-25 years old, that the pelvic Suez flexibility will be corrected by Thomas test, the power of abdominal muscles using straight leg & lumber lord sis were measured by flexible ruler & the results showed that;

-There is no meaningful relationship between lumber lordosis & pelvic Suez flexibility Education students in α=0.05

- There is no meaningful relationship between lumber lordosis& power of abdominal muscles in α=0.05

Sokhangoee, Yahya.,[14]studied on comparing & evaluating the flexible relationship between hamstring muscular & curvature of spine among athletic & non-athletic students 20-25 years old. So he selected two groups of 40 athletic & non-athletic persons & measured the amount of curvature of spine by flexible ruler &

flexibility of hamstring were measured by straight leg rise test, the results showed that;

- There is no significant differences between curvature of spine among ale athletic & non-athletic students in Tehran University in α=0.05
- There is no meaningful relationship between flexibility of hamstring muscular & curvature of spine in athletic students in α=0.05
- There is no meaningful relationship between flexibility of hamstring muscular & curvature of spine in non-athletic students in α=0.05
- There is no significant differences between correlation flexibility of hamstring muscular & curvature of spine among athletic & non-athletic male students in Tehran University α=0.05.

Matchel [11] studied on muscular & skeletal disorders in computer users; he studied on 1800 employees of company that they worked by computers & did it for 24 months & then found that computer users feel pain in his/her hands, arms, shoulders & necks because of immobility.

ST & et al studied on the impact of body mass index on muscular & skeletal disorders & workplace pressures & ergonomic equipment on computer users & they studied on 100 employees of BPO Computer Company in India & found that increasing the body mass [weight] index & stress have meaningful relationship with increasing disorders, skeletal & muscular injuries.

Sklomatcher studied on job-related back injuries for nurses that this research surveying on ergonomic of work palace & its injuries on nurses & also can see that regarding to the nurses' daily work, unfavorable ergonomic medical equipments along the work & pick up the heavy things are the reasons of injuries & back pain.

Sundstrap studied on workplace ergonomic & power practices for decreasing the chronic pain & lack of efficiency among slaughter employees in Denmark, they used workplace ergonomics & strength training protocol on 66 employees & the results showed that work equipment ergonomic & strength training have meaningful relationship with decreasing the skeletal & muscular chronic pain & also caused to increasing their efficiency.

MATERIALS AND METHODS

Population:

[Statistical] population included all employees of Shirvan Islamic Azad University.

The methods of sampling & sample volume because of limitation of female employees, all employees were surveyed that among 50

persons, just 34 persons accept to present in research

Data collecting tools:

For collecting data were used comparing methods by standard norms & for obtaining information were used anthropometric tests & body composition assessment tests on male employees. For measuring the height of employees & desks & seats dimensions by tape meter & for measuring employees' weight were used weighting scales, for measuring till of desks & seats were used conveyor & for measuring the amount of fat under skin was used fat device detector Omron for measuring height assessment was used checker board [test-NY] & Pdaskob. For demographic data collecting & skeletal muscular pain were used questionnaire.

Analyzing data methods:

After collecting questionnaire & coding was used SPSS 19 software for analyzing the data for describing the characteristics, of sample of research was used descriptive statistics such as; frequency, mean, standard deviation distribution table. For stating the relationship between sample characteristics with demographic situation were used analyzing statistics such as; Spearman's tests [for qualitative variables], Pearson's test [for quantities variables]. The confident coefficient in done tests were 95% [α=0.05] & test power was considered as 80% [β=20%]. After data collecting was done the percentage & percentage evaluation comparisons.

RESULTS

Question 1: is there relationship between body size & employees' seats & desks size?

The statistics (table 1) showed that there is direct & meaningful relationship between weight [Kg] & height [cm] in the $P<0.05$ & confident coefficient 95%.

The statistical surveyed showed that there is inverse relationship between length [cm] & high [cm] of seat in $P<0.05$ & confident coefficient 95%. It means if the length of seat increased, the height of it will be decreased &vice versa. The results (Table 2) are same as Fernando Fox Matcher [11], Eklmir& maybe this disproportion be caused to skeletal muscular pain.

Statistical surveying (Table 7) showed that there is direct meaningful relationship between lumber lordosis & raised abdominal disorders in $P<0.01$ level & confident coefficient 99%, it means, if the lumber lordosis increasing, the persons' raised abdominal disorders will be increased. The results are same as Kohandel & Chaple & Macher[11]. Increasing the amount of fact caused to decrease the disorders of raised

back & also increasing the employees' efficiency [9,7,4].

Statistical surveying showed that there is direct meaningful relationship between down shoulders or abnormal shoulders & rounded shoulders in P<0.05 level & confident coefficient 95%, it means, if down shoulders increasing, the persons' rounded shoulders will be increased. The results are same as Sosti, Sandstrap don shoulder injury could cause to rounded shoulder.

Statistical surveying showed that there is direct meaningful relationship between weight & raised abdomen in P<0.05 level & confident coefficient 95%, it means, increasing weight in persons caused to increasing raised abdominal disorders.

Table 1: surveying on relationship between employees' height & weight Pearson's correlation

		Weight [Kg]
Height [cm]	Pearson's correlation coefficient	0.498
	P-value	0.022*
	Frequency	21

*P<0.05

Table 2: surveying Pearson's correlation relationship between employees' seats high & length

		Length of seat [cm]
High of seat [cm]	Pearson's correlation coefficient	-0.521
	P-value	0.051*
	Frequency	21

* P<0.05

Table 3: surveying Pearson's correlation relationship between difference of employees' desks height with standard ones & difference of their seat height with standard ones.

		Employees 'desk height [cm] differences with standards ones
Standard seat height differences [cm]	Pearson's correlation coefficient	0.588
	P-value	0.005*
	Frequency	21

*P<0.01

Table 4: surveying Pearson's correlation relationship between fat percent & employees' weight

		Weight [Kg]
Fat percent	Pearson's correlation coefficient	0.734
	P-value	0.001*
	Frequency	21

P<0.01*

Table 5: surveying the Spearman's correlation relationship between fat percent & employees' lumber lordosis [back]

		Lumber lordosis
Percentage of Fat	Spearman's correlation coefficient	0.718
	P-value	0.001*
	Frequency	20

*P<0.01

Table 6: Surveying Spearman's correlation relationship between fat percentage & employees' abdominal raising disorders

		Raised abdomen
Percentage of Fat	Spearman's correlation coefficient	0.583
	P-value	0.007*
	Frequency	20

*p<0.01

Table 7: surveying Spearman's correlation relationship between lumber lordosis disorders & employees' raised abdominal disorders

		Lumber lordosis
Raised abdomen	Spearman's correlation coefficient	0.655
	P-value	0.002*
	Frequency	20

*p<0.01

Table 8: Spearman's correlation relationship between employees' abdominal shoulders abnormalities with employees' rounded shoulders disorders

		Rounded shoulders
Down shoulders [abnormal]	Spearman's correlation coefficient	0.444
	P-value	0.050*
	Frequency	20

*P<0.05

Table 9: Spearman's correlation relationship between employees' weight disorders & raised abdomen

		Raised abdomen
Weight	Spearman's correlation coefficient	0.504
	P-value	0.023*
	Frequency	20

*P<.05

DISCUSSION & CONCLUSION

The results of recent research showed that all desks & seats that used in Shirvan University, regarding to the employees' body size to standard desks & seats are lower & there is no ergonomic between desks, seats & employees; body dimensions. This result is same as St that lack of using ergonomic in designing & producing the office supplies caused to creating Skeletal muscular pain & disorders.

The results of recent research showed that highest frequency percentage devoted to the neck, shoulders & the lowest frequency is related to the pain in wrist & elbow & this result is same as St&Sandstrap. Pain in shoulders, neck & hands are more than other parts of body. Regarding to the wrists [%72], left elbow [70%], the highest ones, and just seen in lack of experiences, because of lack or lower work causes to see more pain in back.

Regarding to the results, there were very low pain in footstalk, ankle & knees [24%] that are because of movement & using footrest.

The results of recent research showed that in surveying & evaluating the stature frequency related to the lumber lordosis& raised abdominal & back pointer disorders & lowest frequency percentage devoted to the knees vague deformity. These findings are same as the results of &Emil Sandstrap& can say disproportion among length & height of seat due to skeletal muscles pain.

The findings of research showed that there is meaningful relationship between the difference of employees' desks & seats height with its standard in P<0.01 with confident coefficient 99%. It means, if the difference of desks height with standard is

more, the difference of seat height with standard will be increased. The results are same as AbdoliArmaki, M [1] && this difference due to the muscular-skeletal complications in employees.

The results showed that there is direct meaningful relationship between weight [Kg] & fat percentage in P<0.01 & confident coefficient 99, it means that increasing the weight caused too the fat percentage will be increasing & the results of this research is are same as Stefan IJmker, Birgitte M Blatter., 2006 increasing the weight are happened by increasing fat in body. The results showed that the [23] Troussier, B, etal. 1999. "Comparative study of two different kirds of schodfumitureamang children", 42: 3. here is direct meaningful relationship between fat percentage & lumber lordosis disorders in P<0.01 & confident coefficient 99%, it means that increasing lumber lordosis. The results are same as Matchel [11]. Increasing fat caused to decreasing the lumber lordosis disorders. The results showed that there is direct meaningful relationship between fat & raised abdominal disorders in P<0.01 level & confident coefficient 99%. It means increasing fat percentage causes to increase the raised abdomen.

The results showed that there is meaningful relationship between lumber lordosis disorders & raised abdominal disorders is P<0.01 level & confident coefficient 99%. It means increasing the lumber lordosis cause to rising abdominal disorders. The results are same as Matcher [11]. Increasing the rising abdomen caused to increase the lumber lordosis& decreasing the employees' efficiency. The results showed that there is meaningful relationship between down shoulders disorders & rounded shoulders disorders in P<0.01 level & confident coefficient 99%. It means increasing down shoulders causes to increase rounded shoulders. The results are same as Sandstrap. The main findings are stated based on research goals:

First goal: surveying the ergonomic of seats & desks & proportion with body characteristics, the results showed that;

Most of seats & desks don't match employees' body dimensions. In at all, means of seats & desks height or lower employees & also the employees' frequency distribution surveying based on pain showed that the pain howed that the pain relates to the pain in neck, right hand, ankles & footstalk & these pain are because of non-oncurrence body dimension, it is better to mention that in pain experience surveying among employees showed at at least half of employees experience senior & slight pain in these

positions employees' stature evaluation & urveying showed that the highest percentage related to disorders in spine & trunk among stature disorders the ghest frequency relates to body dimensions, while the height of desk is short, this caused to head & neck bent forward & then caused to pain posterior cervical & then caused to muscular pain. In continues, caused to houlders to forward, increasing curvature & pain in shoulder 7 back. In another way, short seat than body mensions due to knee bent so much & make pain in the front thigh muscles & lumber kyphosis that then make ack pain & weak muscles.

Statistical surveying about the relationship between body dimensions & seat & desk dimensions & the amount of body disorders showed that there is direct meaningful relationship between weight & height. In another hand, there is reverse meaningful relationship between height & seat dimension & also there is meaningful relationship between difference of desks & standard desk & between seat & standard seat that shows tall person use short desk & high weight use short seat. Surveying on body dimensions & disorders showed that persons with high fat percentage have lumber lordosis& also persons who have high fat percentage have rising abdominal disorders & also can see direct meaningful relationship between rounded & down shoulders disorders & also there is meaningful & direct relationship between weight & rising abdominal disorders that these results are happened the effect of lack of movement, weak muscles & motor poverty & these factors along with non-ergonomic equipments caused to make disorders & pain.

Analyzing the results showed that desks & seats dimensions of university is shorter than normal regarding to the employees' height & seats are shorter than normal size.

So, these reasons caused to making skeletal-muscular problems & then caused to decreasing employees' efficiency because of disproportion between desks & seats with employees' body dimensions are against of posture principle& then caused to employees face to muscular-skeletal problems, when the seat height is shorter than normal caused to creating back kyphosis & stretch stress on posterior spine & then creating pain & if seat doesn't have elbow or back is vertical caused to pressures on disk & back. If the height of desk is shorter than normal caused to neck & head bent & due to the pain in neck. Also coming to forward of shoulders caused too rounded shoulder & pectoral muscle be short & posterior muscles of the shoulder girdle placed under tension & if the desk is higher

than normal than body dimension caused to continuous contraction of lifting muscles of scapula [Levator scapulae muscle] & upper trapezius muscle & then caused to face many problems in muscle & if the height of seat is so much, the feet suspended in the air & calf muscles like twins & soleus were shorter in length & are prone to conflict. Against it low of seat height than body dimension person in sitting must bent his/her knee so much & must keep it in this situation that maybe witness the control involvement quadriceps & lumber kyphosis. Finally, regarding to the results of research proposed that physical education experts & professors inform the authorities & organizations form the results of non-standard equipments& also learn to employees from how carrying things, postures of sleeping rest, sitting & studying & using footrest for strengthen muscles & developing physical fitness & also by implementing & proposed suitable desk & seat exercise such as; stretching & isometric strength, muscle fatigue & minimize muscle spasms in workplace.

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