Impact of Application of Body Mechanic Principles on Improving Low Back Pain among Female Workers at Benha University

Howyida, S. Abd El-Hameed[1], Heba, A.Aly[2] and Abeer, Y.Mahdy[2]

[1]Community Health Nursing Department, [2]Medical Surgical Nursing Department, Faculty of Nursing, Benha University
elmokhtar.mohamed@yahoo.com

Abstract: The study aim was to evaluate the impact of using body mechanic principles on improving low back pain among female workers at Benha University. Aquasi experimental design was used in the study. A sample of convince 150 of female workers was selected. The sample was divided into study and control groups. The study was conducted at the Rheumatology Outpatient Clinic in Benha University Hospital and Health Insurance Hospital. Three tools were used for data collection. 1) An interviewing questionnaire to assess the studied participants characteristics and personal habits. 2) A functional capacity assessment rating scale (Aberdeen low back pain scale, 2004) this sheet covers assessment of pain characteristics and variety of activities as daily activities, personal characteristics, social life, rest and sleep. 3) An observational checklist to measure weight and height of studied participants, body posture during sitting, studying, lifting, walking, work and home duties. Result revealed that The study group of female workers who had fewer intermittent pain was less than those in the control group (52.5% vs 60.0 %), frequent daily pain was less between the study group than the control group (63% vs 25%) also, in the immediate posttest study group who had no activity restriction were more than female workers in the control group (8.7% vs 0.0 %) in the follow-up test. Female workers in the study group who had no activity restriction were more than female workers in the control group (26.3% vs 0.0 %). This study concluded that using of body mechanic principles improved the back pain dependency level among female workers in this study group; therefore, it was recommended that body mechanic principles must be used by female workers having low back pain.

[Howyida, S. Abd ElHameed, Heba, A.Aly and Abeer, Y. Mahdy. **Impact of Application of Body Mechanic Principles on Improving Low Back Pain among Female Workers at Benha University.** *J Am Sci* 2011;7(11):457-467]. (ISSN: 1545-1003). http://www.jofamericanscience.org. 57

Key words: Body mechanic principles| low back pain

Introduction

Low back pain is a most common orthopedic public health problem and its related disability is more common in adults aged less than 45 years[(1)]. Several studies revealed that improper using body mechanics increase the load on the back contributing to low back pain in a healthy back or accelerate existing changes in an already damaged back [(2)]

Prevalence study researches[(3)] defined low back pain as an uncomfortable sensation in the lumbar and buttock regions originating from neurons near or around the spinal canal that are injured or irritated by one or more pathological process.[(4)] stated that work-related low back pain is any back pain originating in the context of work and considered clinically to have been probably caused at least in part or exacerbated by the claim ant's job.

The prevalence study [(5)] indicated that physical, psychosocial, and individual risk factors are interrelated at any phase of low back pain and there is strong evidence that work-related risk factors (prolonged sitting, lifting, whole body vibration, heavy physical work and bending) are associated with an increased risk for low back pain.

The prevalence study [(6)] mentioned that low back, pain may be either acute or chronic. Acute pain is usually localized and occurs within *24* hours of the injury and lasts less than 6 weeks. Common causes include muscle tears and sprains. Chronic pain is a complex problem lasts more than l2 weeks and the bio-psychosocial influences on the development of intensity in low back pain.

The prevalence study[(7)] stated that the most common causes of low back pain are mechanical or secondary. Mechanical causes of low back pain include dysfunction; of the musculoskeletal and ligamentous structure. Pain can originate from the disc, annulus, facet joint and muscle fibers. Secondary causes include metabolic disease, referred pain from other sources, fibromyalgia and psychogenic pain so that its management requires treatment for the underlying condition. Most low back pain is caused by one of many musculoskeletal problems, including acute lumbosacral strain, unstable lumbosacral ligaments and weak muscles, osteoarthritis of the spine, spinal stenosis, intervertebral disk problems, and unequal leg length. Obesity, postural problems, structural problems, stress, overstretching of the spinal supports, and occasionally depression may also result in back pain. Back pain due to musculoskeletal disorders usually is aggravated by activity, whereas pain due to other conditions is not. Older patients may experience back pain associated with osteoporotic vertebral fractures,

osteoarthritis of the spine, spinal stenosis, and spondylolisthesis among other conditions.

The prevalence study [8] clarifies that using proper body mechanics when performing any activity is paramount for protecting from injury. This is because good body mechanics reduces unnecessary stress on the spine while perform functional tasks. Body mechanics is about how joints, bones and muscles work together to produce human movement.

There are several practical reasons to use proper body mechanics when performing physical tasks. Not only to reduce the risk of injury, but also using the correct techniques can keep from becoming overly fatigued when doing physical labor. Employing the appropriate body mechanics requires less energy to complete a task, makes it easier to lift or move a large or heavy object, and puts less strain on the back, legs and arms**.** [9].

The major objectives of the community health nurse role are to protect and promote the health of people who work for their own well-being and maintaining their efficiency and productivity [10]**.** The functions of the occupational health nurse are directed toward prevention, protection, and health education. Researchers stressed that ergonomics intervention program prevent disability and identify workers who are at risk for adverse low back pain outcome [11]**.**

Significance of the Study

Low back pain is the most common, costly musculoskeletal problem affecting the working population at Benha University. The female workers who are affected by this problem poses a negative effect on their works. New technologies have increased the speed of production, putting pressure on workers to perform rapid and repetitive motions. In addition[12], a study workers in the General Egyptian Company for Component of Railway at Helwan, revealed That work characteristics, work demands and unavailability of work facilities are responsible for the occurrence of low back pain. As well the researchers found that work-related low back pain is a significant and increasing health problem that needs further researches. In Egypt, back pain affects 60% of the population and has a significant effect on industrial outcomes [13]**.**

The study on occupational factors leading to back pain among industrial workers [14] found that 71% of workers in a detergent company were suffering from low back pain and 12.2% from them working in office, in another study, 70% of patients were attending Rheumatology and Rehabilitation Outpatient, had moderate to severe disability from low back pain and most of them were severely dissatisfied in their jobs [15].

Low back pain in the United States of America constitute 25% of all disabling occupational injuries and causes a loss of 14000 work days per 1000 workers each year especially in adults under the age of 45 years[16]**.** Low back pain is a human condition that leads to fear and misunderstanding so the female workers need a health promotion program.

Aim of the Study

The aim of this study was to evaluate the impact of using body mechanic principles on improving low back pain among female workers at Benha University.

Hypotheses

Female workers who will use body mechanic principles will experience improved low back pain than female workers who will not perform them. The degree of low back pain is influenced by body mass index.

2. Subjects and Methods

Design:

A quasi-experimental design was used.

Setting:

The study was conducted at two areas. The Rheumatology Outpatient Clinic in Benha University Hospital and Benha Health Insurance hospital in which female workers with low back pain attended to these hospitals for receiving care.

Sampling:

A convince of sample 150 female workers who were working at Benha University and who fulfilled the inclusion criteria (diagnosed as low back pain patients, duration of their complaint started from more than 3 months, their age less than 45 years, they sit during most of their working hours and attended to the above mentioned settings to receive medical care) were included in the studied sample. The sample equally divided into two groups (80 in the study group and 70 in the control group) on a simple random basis according to their registration number, later ten female workers have withdrawn from the control group.

Tools

Two tools were developed to assess the improvement of the female workers low back pain. The first tool was an interviewing questionnaire, which consists of three parts. *The first part* was designed to assess personal characteristics of the studied sample such as, age, sex, educational level, marital status, working condition (job type, working hours and salaries), health habits as practicing of exercise (patterns, types). *The second part* included an assessment sheet for measuring weight and height and calculate the body mass index (BMI) according to the **WHO** (**2000**) classification: normal BMI= 18.5-24.9 kg/ M^2, overweight BMI= 25.0-29.9 Kg/M^2, obesity BMI= 30.0-39.9 kg/M^2 and the extreme obesity BMI=40.0kg/M^2. *While the third part* consists of pain functional capacity assessment sheet which adapted from both; functional rating index. **(Aberdeen low back pain scale, 2004)** The functional capacity assessment covered assessment of pain (intensity, frequency and duration), daily activity as personal care,

and social life, and traveling, sleeping, sexual life, frequency of bed rest and work duties.

Scoring system:

Done to interpret how low back pain female workers affects their ability to manage a variety of activities. Each question had five answers ranged from 0 (no effect) to 4 (worst possible effect). The total score was 60 points. The participants backache categories were as the follows: 0-5= No disability, 6-17= mild, 18-29 =moderate, 30-41= severe and above 41=complete disability. The second tool was an observational checklist which was developed to observe using body mechanic principles among the studied participants while sitting, standing, walking, bending and lifting. The observational checklist was estimated according to ***Chansirinukor et al,*** [17] *and* ***Ozcan,*** [18] scales. It was scored as 2 (for using the body mechanic principles and maintaining them), 1 (for using but not maintaining them) and 0 (for not using them at all). The total score was calculated by summing up all items and dividing them into percentages where less than 60% represented unsatisfactory body mechanic practice and 60% or more was considered a satisfactory body mechanic practice. All these tools were used pre, immediately after and post using the body mechanic principles.

Pilot study:

A pilot study was carried out for 10% participants (who were later excluded from the main study sample) to test the relevance, clarity, applicability of the tools used and to estimate the approximate time required for data collection and filling in the tools find out any problems that might interfere with the process of data collection. The pilot study revealed that some questions needed to added, restated and others omitted. The content validity of the tools were revised by six consultants in Community Health Nursing, Medical Surgical Nursing specialities and by an orthopedic specialists.

Field work

An official permission to conduct the study was obtained from directors of Benha University and Health Insurance Hospital. The female worker who were diagnosed by physician complaining from low back pain and fulfilled the inclusion criteria were involved in this study. A complete description of the purpose and nature of the study was approached to the participants and an oral consent was taken from each of them Confidentiality also was assured for each female worker. An individual interview was conducted both for study and control groups to collect the necessary data using the tools of data collection.

The principles of body mechanics were implemented in the Outpatient Rheumatology patients' clinic at both hospitals. Female workers were interviewed using assessment sheet of pain functional capacity checklist, from 8am-3pm for two days| week, The interview was conducted in privacy and using simple language. The average number interviewed| day was around 10 female workers and duration of filling questionnaire and assessment sheet was 30-45 minutes. This phase took two months to interview all female workers (150) recruited for the study sample Then, the study group exposed to educational intervention about causes of low back pain, risk factors as well as teach them good body mechanic and certain exercises that help in relieving the back pain. The study group divided into 16 groups, each contains 5 participants. Two theoretical sessions were assigned to the study group two and other two sessions were about good body mechanics and practicing certain exercises that help in strengthening back muscles and relieving low back pain. Group discussion AS will as, video tapes to watch and follow exercises and practice were used. Post test was conducted immediately post intervention and after 3 months by using the same tool. The duration of this study lasted from August 2010 to August 2011.

Statistical analysis:

The statistical Package for Social sciences,(SPSS) version 12 was used for statistical analyses of data. Data were coded and summarized using mean and standard deviation for qualitative variables. Comparisons between both groups (study, control) were done suing chi-square, independent sample t-test and non-parametrical Mann-Whitney test for quantitative variables. The P-values $\leq$ 0.05 was considered statistically significant.

3.Results

Table (1) reveals that age for the female workers under study ranged from 30 to 45 years with the mean of 39.55 ± 3.94 for study group and 39.93 ± 3.83 for control group as for marital status. 91.2%and 98.6% from both groups (study & control) group respectively were married. Regarding educational level, 60% and 51.4% of both groups respectively had technical secondary school education (industrial or commercial). Furthermore, 18.7% and 22.9% of both groups respectively graduated from university.

Table (2) displays the participants, work characteristics. The results revealed that 36.3%, and 38.6% of the study and control groups worked as in secretary, while 63.7% and 61.4%, among the study and control groups respectively, have administrative works and the mean work years for the study group was 18.01 ± 4.39 and for the control group was 18.13 ± 3.26 years. As well, the highest percentage of the participants worked in morning shift (80.0% and 87.2 % of both groups respectively) and the mean salary for the study group was 667.50± 190.12 pounds and 705 ± 141.3 among control group.

Concerning BMI, more than half 55% of the study group and more than three fifths (61.4%) of the control group were obese.(table 3 & figure 1)

Table (4) portrays the participants' pattern and types of practicing exercises. It revealed that 73.8% and 81.4% of study and control groups respectively were not practicing exercises and 66.7 % of them practiced exercises among study group versus38.5, among the control group and 61.5 % of control group were practicing regularly exercises. As well, in both groups (study & control) those practicing walking represented 61.9% and 76.9% respectively.

Table (5) shows that intensity of pain was severe among 47.5%, 36.3% and 17.5% of study the group in pre-test, immediate post-test1 and at follow up test respectively; while they represented 37.2%, 38.6% and 38.6% respectively among the control group with significant differences at follow up test (P< 0.001) (Fig. 2).

Regarding frequency distribution of low back pain, for intermittent (weekly) frequency they represent 67.5%, *52.5%* and 45.0% in pre-test, immediate post-test and follow up test respectively among study group. Daily frequency of pain declined to be 7.5%, 6.3% and 0% of workers respectively. The highly statistically significant differences were detected between study and control groups in post-test 1 and follow up test (P< 0.001) (Table 6, Fig. 3).

Regarding to the duration of low back pain from one week to less than one month it represent in, 52.5%, 47.5% and 36.3% of the study group in pre-test, immediate post-test and follow up test respectively. Additionally, one month duration of pain was present in 13.7%, 8.8% and 3.7% respectively. While 12.8%, 15.7% and 15.7% had one-month duration of pain among the control group respectively. A significant difference was detected between the study and control groups in (post-test2) follow up test (p< 0.001). (Table 7, figure 4)

As observed from table (8) that 32.5%, 35.0% and 42.5% among the study group and similar 42.9% percentage of control group can stand for two

hour in pre-test, post-test 1 and follow up respectively, while workers ability to stand for half an hour was 13.8%, 8.8% and 2.5% among the study group respectively and an equal percentage of 14.2% among control group and there was a statistical significant difference in follow up test (P= <0.02), while 11.3%, 2.5% and 0% respectively of workers among study group compared with similar percent of 10.0% among the control group reported the ability to sit for half an hour only. Before the intervention, none of the workers among study group was able to sit in any chair, but in follow-up test, 13.8% became able to sit in any chair. There were significant differences between both groups in post-test (P< 0.04) and follow-up test (P< 0.001).

As regards to female workers, ability for walking table (9) indicates that 16.3%, 12.5% and 3.8% were able to walk for 15 minutes only among the study group in pre-test, post-test and follow-up test2. In relation to walk any distance, 13.7%, 13.7% and 12% were among study group respectively. There were statistically significant differences between both groups in post-test 1 and follow up test (P<0.02 &P 0.001 respectively). The current results revealed that 30.0%, 38.8% and 43.7% among the study group can touch ankle with tip of finger.

Table (10) presents that female workers ability to lift medium weight (15kg) among study group represented 26.2%, 32.5% and 36.3% in pre-test, post-test and follow-up test respectively as compared to unequal percentage of 21.4% among control group. Significance difference was found in follow-up test (p<0.05).

In relation to BMI of the studied group, table (11) indicates that mean total score of disability among obese workers in the study group were 23.18 ± 4.18 in pre-test and 17.67 ± 3.03 in follow-up test. Regarding overweight, the mean total score of disability were.21.61±4.62 and 16.50 ± 3.75

4. Discussion

The study aimed to evaluate the impact of using body mechanic principles on improving female workers at Benha University who have low back pain and to evaluate the effectiveness of this intervention on improving female workers low back pain of both groups, most of them were married, the highest percentage of them secondary technical education and more than half were obese and their age ranged between 39-45 years. These results were consistent with Al-**Arfaj,et al** [(2)], who found that the prevalence of LBP increases among workers above 30 years old reaching maximum in age 40-50 years, most of them were married and the majority of them were females.

The present study showed that, around two third of female workers among both groups worked in administrative departments that may lead to no change in their postures from sitting to standing but the female workers in secretary departments had chance to change postures to get what they need for work and the majority started work from 15-24 years age in morning shift. This finding indicated that LBP may occur by the cumulative adverse effect on the vertebra during the duration of work. This finding was supported by ***Kamel et al.,***[(19)] who concluded that duration of work has showed a significant effect on the occurrence of LBP. On the other hand, ***Johanning,***[(20)] revealed no existence of such relation between LBP and duration of work among 584 subway train operators in New York. The female workers are not suitable to cover their life demands as the highest percentage of them get 600 to less than 900 L.E. /month. So, most of them get

overtime to increase their income that lead to sitting for long time with burden on the lumbar region which leads to low back pain.

Table (1): Personal characteristics of the studied subjects. n =150.

Demographic Characteristics	Study Group n=80		Control Group n=70		Test	p-value
	No.	%	No.	%		
Sex						
Male	11	13.8	12	17.1	X2= 0.33	0.65
Female	69	86.2	58	82.9		
Age (years)						
30-	5	6.3	4	5.7		
33-	11	13.7	9	12.9		
36-	5	6.3	7	10.0		
39-	26	32.5	20	28.6		
42 – 45	33	41.2	30	42.8	t=0.59	0.55
X ± SD	39.55 ±3.94		39.93 ± 3.83			
Marital Status						
Married	73	91.2	69	98.6	x2= 4.26	0.12
Widower	3	3.8	0	0		
Single	4	5.0	1	1.4		
Educational level						
Basic	13	16.3	18	25.7	x2=5.91	0.21
Secondary (technical)	48	60.0	36	51.4		
University	15	18.7	16	22.9		

* Statistically significant difference (P ≤ 0.05) ** Highly statistically significant difference (P ≤ 0.001)

Table (2): Frequency distribution of the study subjects related to their work condition n =150.

Work Condition	**Study Group N=80**		**Control Group N=70**		**Test**	
	No.	**%**	**No.**	**%**		
Work Categories						
Secretary	29	36.3	27	38.6		
Administrative	51	63.7	43	61.4	X^2= 2.76	0.25
Work in years						
5-	5	6.3	0	0		
10-	8	10.0	10	14.3		
15-	23	28.7	24	34.3	t-0.18	0.86
20-24	44	55.0	36	51.4		
$\bar{X}$ ± SD	18.01 ± 4.39		18.13 ± 3.26			
Work Shifts						
Morning (8-3)	64	80.0	61	87.2		
Afternoon (8-5)	9	11.3	5	7.1	X^2=1.37	0.50
Night (8-7)	7	8.7	4	5.7		
Worker's Salary						
300-	25	31.2	13	18.6		
600-	41	51.3	48	68.6	T=1.38	0.17
900-1100	14	17.5	9	12.8		
$\underline{X}$ ± sd	66.750 ± 190.12		705 ± 141.30			

* Statistically significant difference (P ≤ 0.05). **Highly statistically significant difference (P ≤ 0.001)

Table (3): BMI characteristics of the studied subjects n =150.

Items	Study Group N=80		Control Group N= 70		T-Test	P- value
	No.	%	No.	%		
Body Mass Index					-1.33	0.18
Less than 25 (normal)	8	10.0	2	2.9		
25-29.9 (overweight)	28	35.0	25	35.7		
30-39.9 (obese)	44	55.0	43	61.4		
$\bar{X} \pm SD$	30.38 ± 4.52		31.33 ± 4.19			

* Statistically significant difference (P ≤ 0.05) ** Highly statistically significant difference (P ≤ 0.001)

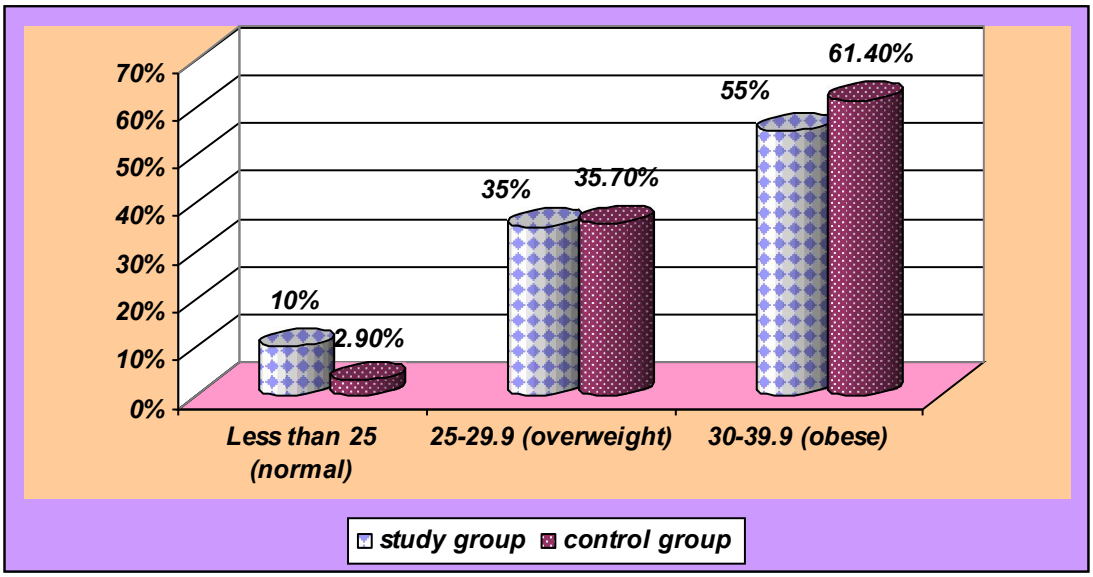

Figure (1):BMI characteristics of the studied subjects (n150)

Table (4): Frequency distribution of the studied subjects related to practicing exercises n 150.

Practicing of Exercise	Study Group		Control Group		Test	
	No	%	No	%	X^2	P-value
Yes	21	26.2	13	18.69	1.26	0.33
No	59	73.8	57	81.4		
Pattern					3.71	0.16
Regular	7	33.3	8	61.5		
Sometimes	14	66.7	5	38.5		
Types					4.78	0.44
Walking	13	61.9	10	76.9		
Running	1	4.8	2	15.4		
Aerobic	7	33.3	1	7.7		

*** Statistically significant difference (P ≤ 0.05) ** Highly statistically significant difference (P ≤ 0.001)**

Table (5): Frequency distribution of low back pain intensity among the study and control groups before and after using body mechanic principles n= 150.

Intensity of Pain	Pre-test				Immediate Post-test l				Follow-up test			
	Study Group N=80		Control Group n=70		Study Group n=80		Control Group n=70		Study Group n=80		Control Group N=70	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Mild	6	7.5	5	7.1	10	12.5	6	8.6	30	37.5	6	8.6
Moderate	32	40.0	34	48.6	37	46.2	33	47..1	36	45.0	33	47.1
Severe	38	47.5	26	37.2	29	36.3	27	38.6	14	17.5	27	38.6
Worst	4	5.0	5	7.1	4	5.0	4	5.7	0	0	4	5.7
	X^2=1.85 p=0.60				x^2 = 0.64 p=0.89				x^2 = 23.69 p<0.000l			

* Statistically significant difference (P ≤ 0.05) ** Highly statistically significant difference (P ≤ 0.001)

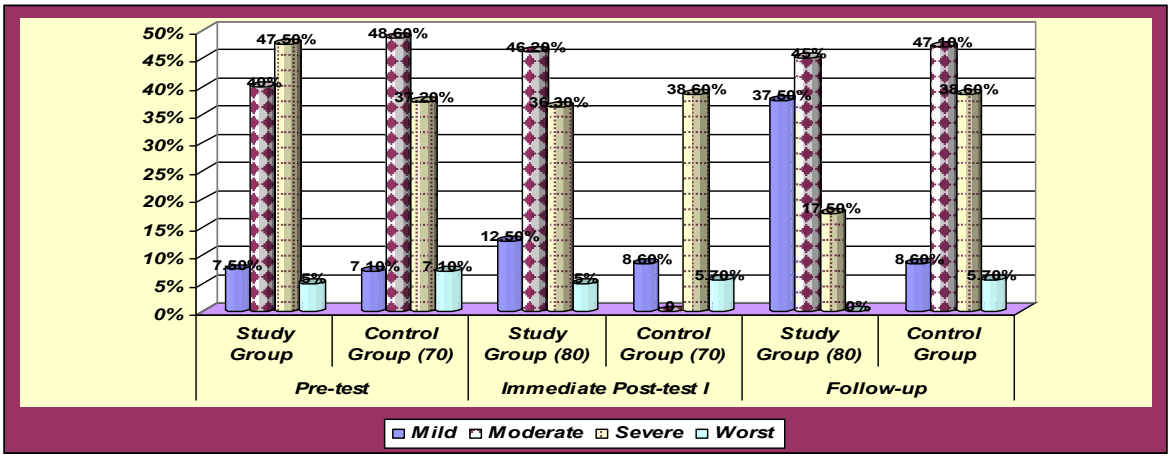

Table (6): Frequency distribution of low back pain frequency among study and control groups before and after using body mechanic principles

Frequency of pain	Pre-test				Immediate Post-test				Follow-up –test			
	Study Group (80)		Control Group (70)		Study Group (80)		Control Group (70)		Study Group (80)		Control Group (70)	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Occasional (monthly)	20	25.0	22	31.4	33	41.2	10	14.3	44	55.0	10	14.3
Intermittent (weekly)	54	67.5	46	65.7	42	52.5	42	60.0	36	45.0	42	60.0
Frequently (daily)	6	7.5	2	2.9	5	6.3	18	25.7	0	0	18	25.7
	x^2=2.08 p = 0.35				x^2 =19.07 p<0.001				x^2 =39.38 p<0.000l			

* Statistically significant difference (P ≤ 0.05) ** Highly statistically significant difference (P ≤ 0.001)

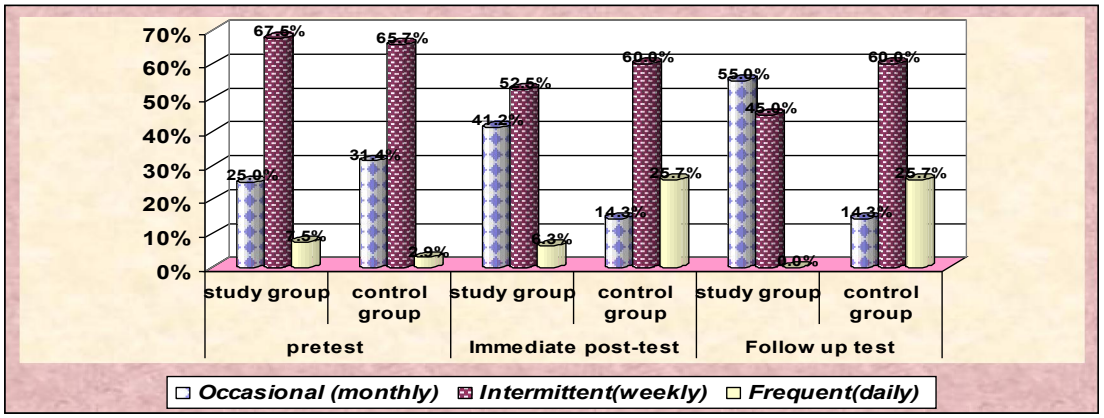

Table (7): Frequency distribution of low back pain duration among study and control group before and after using body mechanic principles

Duration of Pain	Pretest				Immediate Post-test 1				Follow up Test			
	Study Group N=80		Control Group N=70		Study Group N=80		Control Group N=70		Study Group N=80		Control Group N=70	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Less than 24 hours	0	0	0	0	3	3.7	0	0	18	22.5	0	0
Day	27	33.8	27	38.6	32	40.0	26	37.1	30	37.5	26	37.1
Week	42	52.5	34	48.6	38	47.5	33	47.2	29	36.3	33	47.2
Month	11	13.7	9	12.8	7	8.8	11	15.7	3	3.7	11	15.7
	$X^2 = 0.38$ p = 0.83				$x^2 = 4.21$ p = 0.24				$x^2 = 22.55$ p< 0.0001			

* Statistically significant difference (P ≤ 0.05) ** Highly statistically significant difference (P ≤ 0.001)

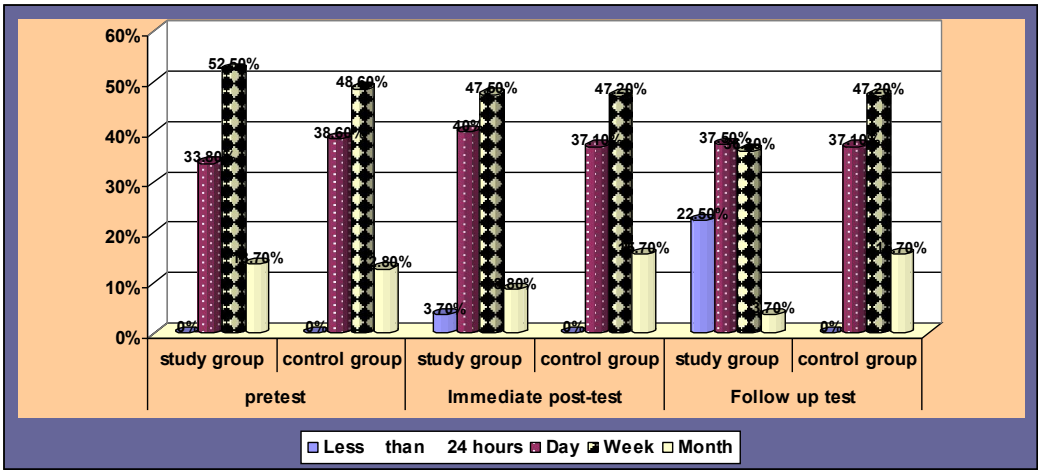

Table (8): Frequency distribution of female workers regarding their Standing and Sitting among study and control groups after using the body mechanic principles.

Item	Pre-test				Post-test 1				Follow –up test			
	Study Group (80)		Control Group (70)		Study Group (80)		Control Group (70)		Study Group (80)		Control Group (70)	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Standing												
Stand several hours	0	0	0	0	0	0	0	0	3	3.7	0	0
Stand 2 hours	26	32.5	30	42.9	28	35.0	30	42.9	34	42.5	30	42.9
Stand one hour	43	53.7	30	42.9	45	5.6.2	30	42.9	41	51.3	30	42.9
Stand half an hour	11	13.8	10	14.2	7	8.8	10	14.2	2	2.5	10	14.2
	X^2=1.99 p = 0.37				X^2= 2.94 p = 0.23				X^2 = 9.66 p<0.02			
Sitting												
Sit in any chair	0	0	0	0	1	1.3	0	0	11	13.8	0	0
Sit in suitable chair long time	35	43.7	29	41.4	45	56.2	27	38.6	45	56.2	27	38.6
Sit for an hour	36	45.0	34	48.6	32	40.0	36	51.4	24	30.0	36	51.4
Sit for half an hour	9	11.3	7	10.0	2	2.5	7	10.0	0	0	7	10.0
	X^2 = 0.20 p = 0.90				X^2=7.88 p<0.04				^{2} X = 24.34 p<0.001			

Table (9): Frequency distribution of female workers regarding their ability for walking and bending among study and control groups after using the body mechanic principles.

Item	Pre-test				Immediate Post-test 1				Follow-up test			
	Study Group n=80		Control Group n=70		Study Group n=80		Control Group n=70		Study Group n=80		Control Group N=70	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Walking												
Walk any distance	11	13.7	5	7.1	11	1.3.7	5	7.1	17	21.2	5	7.1
Walk for one hour	31	38.7	21	30.0	33	41.3	16	22.9	35	43.8	16	22.9
Walk for half an hour	25	31.3	3.4	48.6	26	32.5	39	55.7	25	31.2	39	55.7
Walk for 1 5 minutes	13	16.3	10	14.3	10	12.5	10	14.3	3	3.8	10	14.3
	$X^2 = 5.3$		p= 0.15		$X^2 = 10.13$		p<0.02		$X^2 = 19.88$		p< 0.0001	
Bending												
Touch the floor	0	0	0	0	0	0	0	0	4	5.0	0	0
Touch ankle with tip of finger	24	30.0	15	21.4	31	38.8	14	20.0	35	43.7	14	20.0
Touch knee with tip of finger	44	55.0	47	67.1	43	53.7	49	70.0	37	46.3	49	70.0
Touch mid thigh with tip of finger	12	15.0	8	11.5	6	7.5	7	10.0	4	5.0	7	10.0
	$X^2 = 2.32$		p=0.31		$X^2 = 6.25$		p<0.04		$X^2 = 14.89$		p<0.002	

Table (10): Frequency distribution of female workers regarding their ability for lifting among study and control groups after using the body mechanic principles.

Lifting	Pre-test				Immediate Post-test				Follow-up test			
	Study Group (80)		Control Group (70)		Study Group (80)		Control Group (70)		Study Group (80)		Control Group (70)	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Lift heavy weight (20 kg)	5	6.3	4	5.7	5	6.2	4	5.7	8	10.0	4	5.7
Lift medium weight (15kg)	21	26.2	15	21.4	26	32.5	15	21.4	29	36.3	15	21.4
Lift light weight (5 kg)	54	67.5	51	72.9	49	61.3	51	72.9	43	53.7	51	72.9
	$X^2 = 0.53$		p = 0.77		$X^2 = 2.45$		p=0.29		$X^2 = 5.83$		p<0.05	

Table (11): Total mean score of disability in relation to BMI according to Pre-test and follow-up test among the studied group.

Body Mass Index	Total Score of Disability		F	P
	Pre-test	follow-up test		
<25 (normal)	24.38 ±4.03	20.08 ±2.84	0.20	0.82
25-29.9 (overweight)	21.61±4.62	16.50±3.75		
30 or above (obese)	23.18±4.18	17. 67 ±3.03		

The present study showed statistically significant differences between both groups in relation to intensity, frequency and duration of pain after using body mechanic principles. This finding was supported by ***Schneider***, [21] who identified that after intervention moderate pain occurred one time/week and lasted from 1 hr to one week among German workers.

The current study result revealed that, in relation to consequences on body postures, after intervention there were statistically significant differences between both groups regarding ability to stand for long time. But highly statistically significant difference occurred between both groups for ability to sit for long time in follow-up test. This may occur because intervention included body mechanic and ideal postures during sitting. Furthermore, there were statistically significant differences between both groups regarding the ability to walk and the ability to bend in post-test1 and follow-up, test while minor difference for lifting heavy loads in post-test 2. Also, **Abdul *Rassoul,*** [14] revealed that picking load from the ground, carrying load near body, long sitting and long standing also leads to low back pain.

Regarding functional capacity assessment, the current results revealed that a highly statistically significant difference in mean of total disability score among study group in immediate post–test and follow-up test. This enhancement may be attributed to using body mechanics principles by the study group. These results indicated that using body mechanic principles had its positive effect on functional ability with female workers who had LBP and reflected on their health.

As regards to BMI, it is noticed that total disability scores improved between pre-test and follow-up test. This may be due to interventions regarding allowed and restricted foods to minimize weight but no significant differences occurred as losing weight takes long time. This in agreement with ***Mohamed,*** [(22)] who indicated that total disability score with BMI revealed a non-significant relation (p=0.82).

Conclusion

According to the result of the present study it can be concluded that there were more improvements regarding low back pain characteristics (intensity, frequency & duration) among the study group than control group after using the body mechanic principles. It was also found that higher body mass index increases low back pain and the degree of disability.

Recommendations:

Further studies are needed to be conducted on a larger sample size in order to general the results of the study.

Community health nurses can be more effective while serving as resources for developing and implementing of low back pain prevention programs.

Design and implement nutritional intervention, body mechanic principles and physical fitness programs for variety of population (mothers at home visit workers in working place teachers and administrative staff in schools and universities to prevent low back pain.

Female workers who will use body mechanic principles will experience improved low back pain morethan female workers who will not perform it.

Corresponding author
Howyida, S. Abd ElHameed
Community Health Nursing Department, Faculty of Nursing, Benha University
elmokhtar.mohamed@yahoo.com

References

1) **Abdelmoneim, I., & Khan, M. (2002):** Musculoskeletal and Back Problems among Bus Drivers Operating Intercity and in Cities Services. Kingdom of Saudi Arabia, Bulletin of High Institute of Public Health, 32 (2): 36-42.
2) **Al-Arfaj, A., Al-Saleh,.,S., Alballa.,A., Al-Dalaan, S., BahabriM., Al-Sekeit,.R, & Mousa, M. (2003):** The Prevalence of Back Pain in the Adult Population of Al-Qassem Central Province, Kingdom of Saudi Arabia. Saudi Med J, 24 (2): 170-173.
3) **Aqqad, B., Ammoura, S., & Mohamad, A. (2004):** Low Back Pain among Royal Jordan Air Force Personnel. Medical Journal of Cairo Univeristy, 72 (1): 109-11.
4) **Bergstom, G., Bodin, L., Bertilsson, H., & Jensen, I. (2006):** Risk Factors for New Episodes of Sick Leave Due to Neck or Back Pain in a Working Population. A Prospective Study with an 18 Month a Three Year Follow-up. Occup Environ Med, 131-139.
5) **Boduk, N. (2004):** Management of Chronic Low Back Pain. MJA., 180 (2): 79-83.
6) **Datta, D. (2005):** Low Back Pain. Textbook of Rheumatology, (7th ed.). Philadelphia: Elsevier Saunders. Pp. 588-600.
7) **Fragusonm, S., Marras, W., & Burr, D. (2004):** The Influence of Individual Low Back Pain Health Status on Workplace. Ergonomics, 47:1226-1237.
8) **Ghaffari, M., Alipour, A., Jensen, I., Farshed, A., & Vingard, E. (2006):** Incidence and Recurrence of Disabling Low back Pain, Neck and Shoulder Pain. Spine, pp 2500-2506.
9) **Goldberg, L., & Elliot, D., (2000):** Exercise for Prevention and Treatment of Low Back Pain. Exercise for Prevention and Treatment of Illness. Philadelphia: F.A. Davis Company, pp.153-170.
10) **Grabois, M. (2005):** Management of Chronic Low Back Pain. American Journal of Physical Medicine and Rehabilitation, 84 (3) :29-41.
11) **Hills, E. (2005):** Mechanical Low Back Pain. Medicine Journal, 2 :12.
12) **Seif El-Naser, E. (2002):** Low Back Pain among Workers in General Egyptian Company for Components of Railways at Helwan. Unpublished Master's Thesis, Faculty of Nursing, Cairo University.
13) **Nachemson, A., & Jonsson, E. (2000):** Neck and Back Pain. The Scientific Evidence of Causes, Diagnosis and Treatment. London: Lippincott Williams & Wilkins, pp.165-183.
14) **Abdul Rassoul, S. (2001):** A Study of Occupational Factors Leading to Low Back Pain among Industrial Workers. Unpublished Master'Thesis, Faculty of Nursing, Ain Shams University.
15) **Schneider, S., Lundy, K. & Janes, S. (2003):** Community Health Nursing: Caring

for the Public Health. U.S.A.: Jones and Bartlett Publishers, p.950.

16) **Nies, M., & McEwen, M. (2001):** Community Health Nursing: Promoting the Health of Populations. (3rd ed). Philadelphia: W.B. Saunders Company, pp. 738-760.
17) **Chansirinukor, W., Maher, C., Latimer, J., & Hush, J. (2004):** Comparison of the Functional Rating Index and the 18-Item Roland-Morris Disability Questionnaire: Responsive and Reliability. Spine, 30(1): 141-145.
18) **Ozcan, A. (2006):** The Relationship of the Functional Rating Index with Disability, Pain and Quality of Life in Patients with Low Back Pain. Pain, 12 (10): 435-439.
19) **Kamel, K., Hafez, B., Ibrahim, M., ElGamal, F., & Shawky, M. (2003):** Epidemiological Profile of Low Back Pain in Industry. Bulletin of High Institute of Public Health, 33 :(3).
20) **Johanning, (2004):** Correlation between Pain, Disability and Quality of Life in Patients with Common Low Back Pain. Spine, 29:206-210.
21) **Schneider R., (2006):** Epidemiology of Occupational Low Back Pain. Clinics in Occupational and Environmental Medicine, 5 (3): 501-528.
22) **Mohamed, E. (2005):** Psychosocial Factors in Relation to Disability in Patient with Chronic Low Back Pain. Unpublished Master's Thesis, Faculty of Medicine, Cairo University.

10/10/2011