Original Research

Impact of Workstation Exercise and Ergonomic Exercise on Nursing Population – A Randomized Clinical Trial Research Protocol

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Background

Nursing workers represent a significant proportion of the hospital workforce. In recent times, focus is put on increasing efficacy with reducing the concurrent risks in this population. Many researches imply on including workplace modifications and various exercises to reduce the number of absenteeism and heighten the quality in work. As low back ache is the most prevalent, this study targets on determining the effects of workstation exercise and ergonomic intervention on it.

Purpose -Nursing staff is the base of primary healthcare provision in the Indian background. The most common reason for early retirement, sickness absenteeism, and decline in working population in nurses is low back pain. With proper evidence, the efficacy of workstation activities in nursing staff will mitigate or eliminate this issue in the area of healthcare.

Methods: There will be 3 groups, workstation exercise group, ergonomic modification group and a control group each consisting of 40 patients selected from a fixed criterion. They will be graded with a QOL scale and a pain scale during the start of treatment and after 2 months to compare the results and determine which therapy gets better results.

Results: Statistical analysis will be done after the study's completed by use of concise and inferential tests use Student'sdistribution t test on single and combined analysis, one-way Analysis of Variance (F) ANOVA test and Multiple Comparison: Turkey Test and analytical tools is SPSS24.0 version and Graph Pad Prism 6.0 version and $p<0.05$ is known as value point.

Conclusions: Both the ergonomic training and workstation exercises will result in reduction of low back pain with workstation exercises proving more effective. The Publication will be done after conducting the study and obtaining the results through the statistical analysis.

***Key Words**: Workstation Exercises, Ergonomic Intervention, Quality of Life, Low Back Pain, Nursing Staff, Physiotherapy Approach.*

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Background

Musculo skeletal conditions are the utmost public wellness issue.[1]Those that requires medical condition attention, a difficult issue to tackle with many professional groups, such as the nursing staff. Even though the nurses are trained to administer to such health issues of others, they neglect their own well being for the

sake of reduction of taking leaves and better job caliber. Historically, back pain has become a more common complaint, and most of the health care practitioners are at the greatest risk. Many researchers have become a witness to this condition in their trials.[2]

Community of low back pain (LBP) is highly prevalent, and it has been explored in much research.[3] Findings put it on record that perhaps a multitude of factors relate toward low back pain globally. Some factors include age, genes, body mass index, comportment, style of living, vocational jeopardy, and many others or idiopathic in nature. However the etiology has not yet been known. Thus, intervention as well as preventive strategies was found to lack of documented feasibility on the basis of etiology.[4]

The ergonomic changes to counter act or reduce the pain from low back pain are prominent. The hospital attendants are thoroughly well versed with these. Even though ergonomic modifications have been shown in certain research to also be moderately successful in reducing musculo skeletal disorders, they are very expensive which would be an important factor particularly in developing and undeveloped countries. In such times, the work place training comes in handy. It is relevantly cost effective and also helps to save time and money in recurrent process of modulating and refurbishing of the wards or clinics. It can be worked as it is, to build more support by cost efficiency. In other words, work place work outs save the time and money to start or initiate the treatment program to relieve low back ache.

When determining progression of the disease, the diagnosis, as well as the control of any of the musculo skeletal disorders, Q O L scales are now being used. As widely relevant Q O L is defined as a term that reflects individual responses to different effects of disease on everyday life, affecting to what level real fulfillment should be attained. Measurement of Q O L is detected in recent clinical trials as a significant add-on to achieving therapeutic effectiveness for the beneficial change. Low back discomfort is actually a major deterrent to Q O L and the Q O L scores co related with low back pain and other disabilities.[6]

Visual Analog Scale is a validated and utmost used in all the musculoskeletal, neurological or other conditions. It does not diversify pain in various components and hence is reliable in pre tests, post tests and follow ups. Language barrier or educational intelligence and other factors do not hamper the outcomes of this pain rating scale.

Through this research, we aim at estimating and contrasting the influence of ergonomic alteration and work place exercises on low back pain in a crowdof nursing health care providers.

Objective

1. Assessment of low back pain

2. Analysis of effectiveness of ergonomic changes in low back pain

3. Analysis of effectiveness of workstation exercises in low back pain

4. Comparison of the effects to analyze superior treatment method

Material and Method

The study is set at Datta Meghe Institute of Medical Sciences, Sawangi (Meghe).

The Study design is randomized clinical trial in an intervention group of nursing personnel. Participants will be assigned their groups randomly or by chance.

Study setting - Ravi Nair Physiotherapy College, A V B R H

Sample type – randomized sampling

Sample size – 120

The sample size formulae used are as follows

$\eta_1 = (\sigma_1^2 + \sigma_2^2 / \kappa) (Z_{1-\alpha/2} + Z_{1-\beta})^2 / \Delta^2$

The notations of formulae are

η_1 = sample size of Group 1

η_2 = sample size of Group 2

σ_1 = standard deviation of Group 1

σ_2 = standard deviation of Group 2

Δ = difference in group means

K = ratio of η_2/η_1

$Z_{1-\alpha/2}$ = two sided Z value (e.g. Z = 1.96 for 95% confidence interval)

$Z_{1-\beta}$ = power

- Group A with 40 participants under ergonomic intervention group.

- Group B with 40 participants under workstation exercise group.

- Group C with 40 participants under control group.

Sampling will be allotted randomly. The division of the groups would be on the basis of the time and number of subjects received. The first subject will be allotted Group A, the second subject will be allotted Group B, the third subject will be allotted Group C. the Fourth with Group A and continued henceforth. The chronology of the patient list will be solely dependent upon the time and date of assessment rather than the Alphabetical order or age or other criterions.

Study duration - 6 months

INCLUSION CRITERIA

- Patients willing to participate.

- Permanent nursing staff.

- Age group 18-50 years.

- Diagnosed with low back pain.

- Pain persists more than 1 month.

- Both genders.

EXCLUSION CRITERIA

- Patients not willing to participate.

- Patients not willing to continue treatment for long duration

- Individuals with other musculoskeletal and neurological issues.

- Age group above 50 years.

- Individuals with chronic low back pain.

- Interns and temporary job nurses

- Recent parents with infants and children

- Other chronic conditions.

- Chief cause of pain irrelevant to the nursing chores

MATERIALS

- Printed consent forms for participants.

- Printed sheet of Visual analog scale.

- Printed sheet of WHOQOL BREF scale.

- Ergonomic advice charts.

- Thera bands.

- Lumbar corsets.

DEPENDENT VARIABLES

- Visual Analog scale

- WHOQOL BREF

INDEPENDENT VARIABLES

- Workstation exercises.

- Ergonomic intervention.

- Lumbar corset.

PARAMETERS/ OUTCOME MEASURES:

- Visual analogue scale for intensity of pain measurement

- Reliability: 90% , Validity: 76%-84%

- WHOQOL BERF scale for functional disability and quality of life assessment

- Reliability: 76%-80%

- Validity: physical domain- 67% , Psychological domain- 78% , Social domain- 74% , Environmental domain- 86%

PROCEDURE

The institution ethics committee clearance will be obtained 120 participants will be selected, nurses

who are diagnosed with low Back pain from AVBRH hospital as per the criteria. The informed consent will be obtained. The participants will be explained about the type of study in their own language. They will be divided into 3 groups and each group would be explained the steps of intervention. They will be provided with visual analog scale and WHOQOL BREF scale. Pre-treatment pain and overall quality of life would be calculated. Group A will be educated and facilitated with ergonomic interventions and charts will be given depicting the same. Group B will be taught stretching and strengthening exercises to be done within scheduled breaks during the work hours. Group C will be the control group that will be given lumbar corsets to use. This group will serve as the standard for comparison for Group A and Group B. After two months of treatment, follow up of all the groups will be taken with the same scales and thus will be compared. The data collected will then be analyzed statically.

Hypothesis: The Group A of ergonomic interventions will yield positive results wherein the mean of observations of the Group B of workstations exercises will be more inclined to the value of 1.00 levels. Group C will be inclined to 0.05 re 0.01 level of null hypothesis.

The independent variables of this study will not have co relational analysis with the dependent variables. This will help the study to move forward to the rank order co relation in the specific statistical analysis.

Data Analysis

Statistical analysis will be done after the study is completed by use of concise and inferential tests use Student's distribution t test on single and combined analysis, one-way ANOVA and Multiple

Comparison: Turkey Test and analytical tools is SPSS24.0 version and Graph Pad Prism 6.0 version and $p<0.05$ is known as value point.

The t test is used to determine the statistical significance in small sample observations for near correct conclusions. It rectifies the difference in the curve of small sample distribution when referred to the reliable large sample distribution curve. Many t table list values at various degrees of freedom of rejection of the null hypothesis are at 0.05 and the 0.01 level of significance.

Analysis of Variance (F) ANOVA test is a useful method to pinpoint if the sources of more than the two simple random samplings are sufficiently close for sampling measurement variances and errors to be related. It raises the question if the sample means differ from their own sample means (under variability of the category selected). The significance of the 'F' - ratio is found in 'F' - tables which indicate the values necessary to reject the null hypothesis at the 0.05 or the 0.01 levels.

If the global null hypothesis Ho is dismissed, the researcher's greatest interest is to know how the meaning of t treatments varies. If the global null hypothesis Ho is denied, the researcher's greatest interest is to know how the meaning of t treatments varies.

For each pair of means the Turkey test decides if they are substantially different and is based on a family error rate for comparisons $k = t (t-1)/2$. The procedure is to test the hypotheses: Ho: $\mu_i = \mu_i$, vs. Ho: $\mu i = \mu i$, I = 1, t, and Ho are rejected at a meaning level if

$m_i - m_{i'} > q\ s \sqrt{1/r}$ or $m_i - m_{i'} > q\ s \sqrt{[1/2(1/r_i + 1/r_{i'})]}$,

Where mi and mi' are estimates of the means and ri and ri' are the number of replicates of the treatments I and i' and q = qt, α is the value of the student range with t means, n degrees of freedom associated with s2, the Residual Mean Square.

Prism is a versatile blend of biostatistics, curve fitting (nonlinear and empirical regression) grappling with a robust plan. It may report on intervals of confidence of best-fit parameters as asymmetric ranges (likelihood of profiles), which are far more precise than normal intervals symmetrical. Even it will automatically interpolate unknown values from default curves (I.e., the analysis of RIA data), the comparison of two fits equations using or the Knowledge Criteria for Akaike (AIC), plot residuals, differentially classify outliers weight data points, the normality test residuals and lots more.

As the Sample size is significantly smaller and there are more than two samples, the sampling error will be larger with concerns of the graph of distribution of the means. Altogether in random sampling methods, the

window of error is more than systematic, cluster or convenience sampling. Thus for precise analysis and conclusion of the study, we will use more than one statistical tool. The values generated will justifiably be helpful in rejection of the null hypothesis.

Expected Result

After completing study, result will be calculated by statistical analysis and will be prepared and published in the form of a research paper.

Discussion

At the end of the study duration, both the groups' observations would manifest a cogent that both the work place exercises and the convenient ergonomic mediation work wonders on the nurses suffering from low back ache.

The consistency of results after follow up in four domains of the Q O L scale is not pinned down in all the three groups. The physical and psychological domains show highest average in satisfaction whereas the social and environmental domains don't show much equivalency.[7]This might be due to the level of work stress which was not well accounted for during the period when study was conducted. The longer version of the Q O L can also be applied in further studies for precision.

Difference of findings with the help of Numerical Pain Rating Scale and Visual Analog Scale is almost negligible. Although the Numerical Pain Rating Scale might have more precise value in follow ups.[8]Other new found Pain Rating Scales might also be verified and used for the purpose of fulfillment of the agenda. Although the researches on the more modern approaches to narrow down the pain criterions and denounce its measurement are continuously advancing.

In this study, effects of ergonomic training and work place exercises were evaluated separately. Sahu A, Naqvi WM explained thoroughly the effects and influence exercising does on the human body. It covers all the physical, psychological, pathological, social and moreover importantly environmental and mental aspects in which the exercises help our body.[9]The impact would increase with both the manipulations combined for low back pain. Further studies may involve another group with this type of an intervention.[10]Both the exercises and the ergonomic rules would be compared with a more convenient control group to estimate the amount of recovery from the pain.

The stretching and strengthening exercises both fall under the work station exercises. They both have different effects on the muscles of the lower back. At such times, clinical reasoning for the etiology should be considered before chalking the plan of treatment. This can be achieved with the help of a thorough study of the biomechanics of the lower thoracic, lumbar, sacral and sacroiliac joints.

The inclusion criteria and the exclusion criteria are more precise regarding this study setting. Although every study setting might include more exclusion criteria based on the demographical aspects, geographical aspects, medical characteristics and / or any other external characteristics. With the changes in the goals and objectives of the study, the inclusion and exclusion criteria will change drastically. After the completion of sampling process, additional data of the participant can also compromise the analysis and make it inaccurate or misleading or biased.

Intervention control in all the trials proves as a facilitator to provide and also to compare the statistical analysis.[11]The control groups have a tendency of placebo effects degrading the reliability and validity of the experiment. Thus, cautious selection of the control group and activity allotment is requisite. Pharmacological drugs, yoga, hydro collator pack are some of the activities applicable in control groups for such practice.

Conclusion

The Publication will be done after conducting the study and obtaining the results through the statistical analysis. Both the ergonomic training and workstation exercises will result in reduction of low back pain with workstation exercises proving more effective.

Null hypothesis - Follow up results of low back pain will be same for all 3 groups.

Ethical Clearance: Clearance will be sought from the institutional ethics committee.

Source of Funding: Self

Conflict of Interest: None

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