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3 **Effects of core muscle stability on low back pain and quality of**
4 **life in post- menopausal women: A comparative study.**

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13 **Abstract**

14 **Objective:** To determine the effects of core stability exercises on backache and
15 quality of life of postmenopausal women.

16 **Method:** The comparative study was conducted at the Department of Physical
17 Therapy, Margalla General Hospital, Rawalpindi, Pakistan, from February to
18 June 2018, and comprised post-menopausal woman aged 40-60 years having
19 backache who were randomly divided into experimental group A and control
20 group B. Group A underwent core stability exercises along with traditional
21 therapy, while group B had traditional low backache physical therapy. Each
22 participant was treated three days a week for 12 weeks. The outcome was
23 assessed using the manual muscle testing numerical pain rating scale, Oswestry
24 disability index and Utian quality of life scale at baseline, week 6 and week 12.
25 Data was analysed using SPSS 21.

26 **Results:** Of the 35 subjects initially enrolled, 24(68.5%) completed the study.
27 Of them, 14(58.3%) cases were in group A and 10(41.6%) controls in group B.
28 The overall mean age was 54.54±5.13 years, mean menopause duration was

29 99.79±50.02 months, and mean duration of backache complaint was
30 23.95±14.85 months. Differences in outcome were significant between the
31 groups for flexion and extension manual muscle testing and Utian quality of life
32 scale ($p<0.05$) and non-significant for numerical pain rating scale and Oswestry
33 disability index ($p>0.05$).

34 **Conclusion:** Core stability exercises were found to have the ability to reduce
35 pain, disability and to improve strength and quality of life.

36 **Key Words:** Backache, Core stability exercises, Post-menopause, Oswestry
37 disability index, Utian Quality of life.

38

39 **Introduction**

40 About 80% population once in their life go through lower back pain (LBP) that
41 causes significant loss of productive working hours along with disability^(1, 2).

42 People suffering from chronic LBP (CLBP) and impaired function often
43 experience anxiety and depression, and it has impact on work and social life⁽³⁾.

44 LBP largely effects women aged 45-60 years, accounting for distress on social
45 as well as economic levels⁽⁴⁾.

46 Age-predicted incidence of LBP was also found to be higher in post-
47 menopausal women (90% between 40 and 60; mean age 50.1 years)⁽⁵⁾. Decline
48 in psychological and cognitive function along with other health-related
49 conditions, like heart disease, mood swings and risk of cancer, are of particular
50 importance in post-menopausal women affecting their quality of life (QOL)⁽⁶⁾.

51 The hormonal changes occurring in women during and after menopause may
52 also have an impact on health-related quality of life (HRQOL) particularly in
53 the physical, psychological and sexual spheres⁽⁷⁾. Physical therapy remains the
54 most advanced conservative option for LBP treatment⁽⁸⁾

55 Core stability or core strengthening exercises (CSEs) are increasingly becoming
56 an important element of the sports world of therapeutics as it provides distal
57 mobility with proximal stability⁽⁹⁾. CSEs are supported strongly by theoretical

58 principles for the treatment of spinal disorders that helps in decreasing pain and
59 improving function in people suffering from LBP⁽¹⁰⁾.

60 Core strengthening has attracted limited research attention so far, but it has been
61 promoted as a mode of rehabilitation, for performance enhancement, and as
62 preventive measure against injuries related to the musculoskeletal and lumbar
63 spine.⁽¹¹⁾ The significance of CSEs in post-menopausal women with backache
64 has been overlooked so far. The current study was planned to focus on CSEs in
65 post-menopausal woman with LBP to investigate the effects of core strength
66 training on LBP, disability, strength and the QOL.

67 The null hypothesis was that CSE would have no effect on postmenopausal
68 women with LBP.

69

70 **Subjects and Methods**

71 The comparative study was conducted at the Department of Physical Therapy,
72 Margalla General Hospital, Rawalpindi, Pakistan, from February to June 2018,
73 and comprised post-menopausal woman aged 40-60 years having backache.

74 After approval from the ethics review committee of Riphah International
75 University, Islamabad, the sample size was calculated in the light of literature⁽¹²⁾
76 using Open-Epi calculator. The study was approved by the Ethics Committee of
77 Margalla Institute of Health Sciences.

78 The sample was raised using purposive sampling technique. Those included
79 were post-menopausal woman aged 40-60 years having backache. Those
80 excluded were women with spinal cord injury or with marked degenerative
81 arthritis of spine. The organic causes of spinal pain were ruled out on the basis
82 of history and/or radiology. After written informed consent was taken from all
83 the participants, they were randomised using sealed envelope technique into
84 experimental groups A and control group B. The control group was given
85 traditional LBP physical therapy management, such as moist heat pack,
86 transcutaneous electrical nerve stimulation (TENS), and strengthening regimen.

87 The experimental group had the same regimen along with CSEs. Each
88 participant was treated three days a week for 12 weeks. Assessment was done at
89 baseline, weeks 6 and 12 using manual muscle testing (MMT), numerical pain
90 rating scale (NPRS), Oswestry disability index (ODI) and Utain quality of life
91 (UQOL) tools.

92 Data was analysed using SPSS 21. Normality curve and shapiro wilk test were
93 applied on all variables for data homogeneity. The data was skewed and
94 significance value was < 0.05 , so non-parametric tests were applied. P values
95 were evaluated using Mann Whitney U test for inter-group analyses. pre-post
96 difference was analysed by calculating mean differences from the baseline to
97 final measures.

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99 **Results**

100 Of the 35 subjects initially enrolled, 24(68.5%) completed the study. Of them,
101 14(58.3%) cases were in group A and 10(41.6%) controls in group B (Figure 1).
102 The overall mean age was 54.54 ± 5.13 years, mean menopause duration was
103 99.79 ± 50.02 months, and mean LBP duration was 23.95 ± 14.85 months. All
104 (100%) the participants were married; 18(75%) were housewives 2(8.33%)
105 were teachers; and 4(16.67%) were with other occupations. In group A, the
106 mean age was 53.07 ± 5.42 years; mean history of menopause 86.07 ± 57.86
107 months; and mean LBP history 19.14 ± 12.56 months. There were 9(64.3%)
108 housewives, 1(7.1%) teacher and 4(28.6%) belonged to other occupations. In
109 group B, the mean age was 56.60 ± 4.09 years; mean history of menopause
110 119.00 ± 29.25 months; and mean LBP history 30.70 ± 15.78 months. There were
111 9 (90%) housewives and 1(10%) was a teacher.

112 None of the variables showed significant difference at baseline ($p > 0.05$). post-
113 intervention, the difference was significant for flexion MMT (FMMT),
114 extension MMT (EMMT) and UQOL ($p < 0.05$), and it was non-significant for
115 ODI and NPRS ($p > 0.05$) (Table; Figure 2).

116 Although all variables showed improvements in both the groups, more
117 improvements were noted in experimental group A (Figure 2).

118

119 **Discussion**

120 CSES are increasingly becoming an important element in sports rehabilitation⁽⁹⁾.
121 These exercises are supported strongly by theoretical principles for the
122 treatment of spinal disorders which helps in decreasing pain and improving
123 function in people suffering from LBP⁽¹⁰⁾. K. Amit et al. reported that CSEs
124 reduced pain after 6 weeks of intervention ⁽¹³⁾. Patients with mechanical LBP
125 continue to demonstrate improvement in pain and function following treatment
126 comprising training regimens for lumbar mobilisation and CSEs in comparison
127 with patients treated by specifically joint mobilisation techniques.⁽¹⁾

128 Xue-Qiang Wang et al. reported that CSEs improved physical function
129 considerably compared to general physical exercises in LBP patients⁽¹⁴⁾.
130 Decrease in disability was also noted in the participants of the current study, but
131 were a bit more pronounced in CSE group. However, these results were not
132 differ statistically significant in inter-group analyses. These findings are also
133 supported by a study which reported that CSEs helped reduce disability⁽¹⁵⁾.

134 In the current study, muscle strength significantly improved between and within
135 the groups. Smith et al. suggested that CSEs were instrumental in counteracting
136 age-related changes, core stability-based pilates as exercise played a key role in
137 improving core strength and other parameters, such as balance, mobility,
138 coordination for joints and spinal functions⁽¹⁶⁾.

139 Healthy and fit elderly people are reported to enjoy life better compared to those
140 having disease. Health-related fitness can be greatly enhanced by training
141 regimens in different ways. However, among post-menopausal women, it was
142 unclear how various dimensions of health-related fitness interact with their
143 QOL. Among the studied dimensions, back strength was found to correlate

144 positively with QOL. On the other hand, a negative correlation was reported
145 between increasing age and QOL⁽¹⁷⁾.

146 The current study found significant improvement in post-menopausal women;s
147 QOL in both intra- and inter- group analyses. Küçükçakır N et al. reported that
148 pilates as a treatment option may be a safe and effective alternative for
149 improving QOL in post-menopausal women⁽¹⁸⁾. Sinaki et al. also reported the
150 effectiveness of exercise on the strengthening of the back muscles in women
151 with mean age 56 years over a duration of three months. The study indicated
152 that CSEs strengthened back muscles significantly.⁽¹⁹⁾

153 The current study has its limitations. Though the participants who completed the
154 study were more than the required number, the sample size was too small to
155 allow generalisations. The dropout rate was high as most of the housewives had
156 issues related to conveyance, while the working women had issues related to
157 absence from work. In future studies, patient adherence should be maintained,
158 and the treatment duration can also be increased as some parameters, like
159 strengthening, take time to improve.

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161 **Conclusion**

162 Both the experimental and control groups showed significant improvement in
163 pain, disability and QOL post-intervention. Significant difference was noted in
164 favour of CSEs compared to traditional exercises for strength and QOL.

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167 **Conflict of Interest:** None.

168 **Source of Funding:** None.

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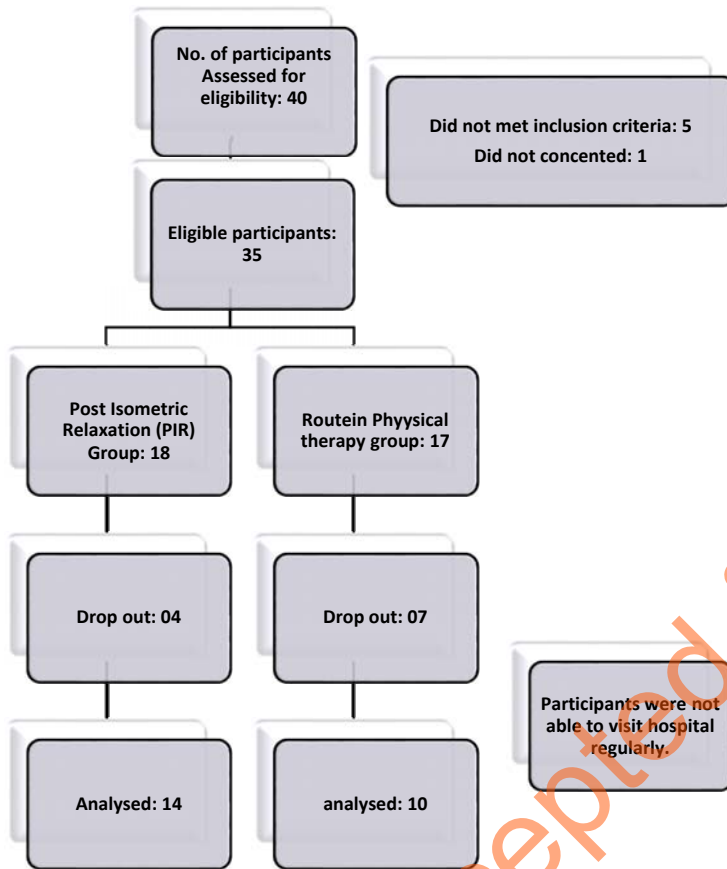
Table: Inter-group analyses using Mann-Whitney U test.

| Variables | Median± IQR | | P value |
|----------------------|-------------|-------------|---------|
| | Group 1 | Group 2 | |
| Pre FMMT | 4.00±1.00 | 3.00±1.00 | 0.198 |
| Post FMMT | 5.00±1.00 | 4.00±0.00 | 0.003** |
| PreEMMT | 4.00±1.00 | 3.00±1.00 | 0.198 |
| Post EMMT | 5.00±1.00 | 4.00±0.00 | 0.003** |
| Pre Utian QOL | 48.00±16.75 | 55.00±8.25 | 0.324 |
| Post UtianQOL | 60.00±10.75 | 55.00±15.00 | 0.048* |
| Pre ODI | 35.00±10.00 | 27.50±11.25 | 0.269 |
| Post ODI | 25.00±10.00 | 25.00±15.00 | 0.692 |
| Pre NPRS | 7.00±0.50 | 7.00±1.25 | 0.722 |
| Post NPRS | 3.00±1.00 | 2.00±1.50 | 0.317 |

234 IQR: Interquartile range, FMMT: Flexion manual muscle testing, EMMT: Extension manual
 235 muscle testing, QOL: Quality of life, ODI: Oswestry disability index, NPRS: Numeric pain
 236 rating scale.

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254 **Figure 1: Consolidated Standards for Reporting of Trials (CONSORT) diagram.**



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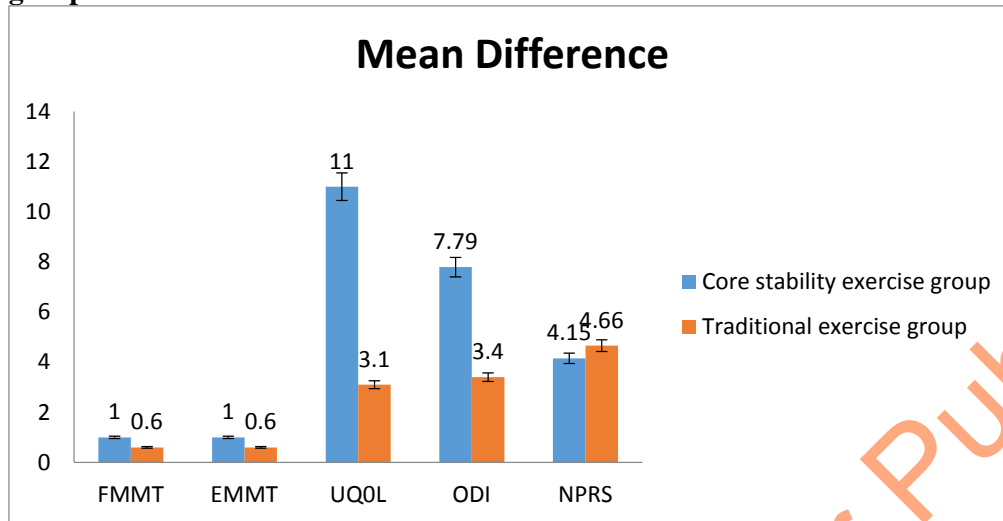
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269 **Figure 2: Mean difference from baseline to post-intervention of all variables of both**
270 **groups.**



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272 FMMT: Flexion manual muscle testing, EMMT: Extension manual muscle testing, QOL:
273 Quality of life, ODI: Oswestry disability index, NPRS: Numeric pain rating scale.
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