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## Original Article

# Impact of Endurance Exercises on Knocked Knees as a General Health Concern

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## ABSTRACT

Knocked knees are a problem in children and adults, making it challenging to walk or run and causing knee pain. In this problem, the knees gradient inward while the ankles remain spaced apart. **Objective:** To analyse the impact of endurance exercises on knocked knees as a general health concern. **Methods:** The study participants were randomly selected from the department of sports science and physical education, University of Punjab, Pakistan. Subjects were categorized as a control group (CG) and an experiential group (EG). Each group was comprised of twenty subjects. All the subjects were informed about the risk and benefits of participation in the study. Thus, written informed consent was taken from each subject. In addition, Ethical approval (293/SPS) was also obtained from the University of the Punjab, Lahore, Pakistan. **Results:** The mean and standard deviation during the pre-test were 50.60±2.35, and the mean and standard deviation during the post-test was 53.05±2.33. The t value was 1.788, and Sig was .96. Therefore, the table shows no significant difference in CG in knee-knocking before and after training sessions imposed upon EG. The mean and standard deviation of EG during the pre-test was 50.00±2.07, and the mean and standard deviation of EG during the post-test was 58.35±2.20. The t value was 17.376, and Sig was .000. Therefore, there was a significant difference during pre- and post-test EG analysis in knee-knocking. **Conclusion:** Based on the analysis, the researcher concluded that exercise has a vital role in rehabilitating the knocked knee.

## INTRODUCTION

The knocked knee is a general health concern found among children; thus, it is recovered in childhood. Sometimes this problem continues till death, but the main factor responsible for such a situation is a lack of awareness and proper concentration. Difficulties in walking, running and other routine activities are associated with knocked knees [1]. Likewise, knee pain, knee pain, limited knee alignment, and direct effects on the body's posture and walk pattern are also problems caused by knocked knees [2]. The knocked knee also affects the performance of the thigh

muscle; the person with banged knee does not walk like an average person because of the difference in knee angle and alignment [3]. A person with a knocked knee has more risk of falling and improper body movement because knocked knee makes a person unstable and imbalanced [4]. A person with knocked knees is always at the risk of falling instead of standing correctly after jumping due to a deformed angle of the knee [5]. The knocked knee is a deformity linked with alteration of knee alignment, thus causing poor body posture and affecting other body

segments. Knocked knee creates difficulties in the lower body and affects the whole body movement styles [6]. Knocked knee directly affect the performance of athletes because knocked knees negatively affect physical fitness and degrades the overall motor functions of our body in any sports, which include running or based on lower muscles mostly [7]. Obesity is a significant health problem for children and adults and cause body load on bones, particularly on leg bones and knee joints. Due to this load, the knee angle becomes deformed and causes knocked knee [8]. Knocked knees originate from the distal femur [9]. Any biomechanical abnormality in any joint of the body, exclusively related to knee joints, causes serious injuries such as knee pain, difficulty walking and arthritis. The exception in the knee joint is majorly driven by knocked knees [10]. In some cases, knocked knee person's patella dislocates due to the knee joint angle difference [11]. Knee muscles are the most influential group of muscles, and the loss of their functions is linked with knocked knees [12]. Poor body movements are commonly observed in children and adults with knocked knees [13]. The most common cause of knee-knocking or genu valgum is medial torsion of the proximal tibia, and due to this, the lateral side becomes more weight-bearing. More weight on the lateral side of the body increases the chances of knee injuries in knocked knee-affected persons [14]. Epiphyseal Staple is used for correcting angular deformity at the knee. This technique is also used to correct knocked knees in children, which was observed to be more effective in children under 11.5 years old [15]. The knocked knee can be treated through a guided growth technique with extra periosteal application of a flexible two-hole plate and screws, but this technique takes 32 months after surgery (16 months for each leg) in children with a mean age of 11.6 years old. Recovery time is faster in children under the age of 10. Through this surgery, 1 of 25 children had a rebound deformity, but no permanent physical tethers were encountered. The guided growth technique, as performed using a flexible titanium plate, is simple and safe for treating periarticular deformities of the leg [16].

## METHODS

The researcher adopted the below procedures to reach specific findings and conclusions. The study was concerned with rehabilitating knocked knees through endurance exercises, so the researcher applied a quantitative research approach. The study participants were randomly selected from the department of sports science and physical education, University of Punjab, Pakistan. Subjects were included in the study by adopting the inclusion criteria such as; subjects having ages more than 18 years and less than 25 years, subjects having no

health issues, subjects voluntarily participating in the study and only male subjects were included in the study. Likewise, the subjects were excluded from the study by adopting the exclusion criteria, such as subjects less than 18 years of age and more than 25 years, issues with health consequences such as heart problems, and subjects who refused to participate. The self-made endurance exercises protocols consisting of Leg Abduction (4×12), Hip Abduction (4×12), Squats (4×12), and Side lunges (4×12) were developed and applied to the subjects for two months. The researcher personally monitored the whole exercise session. Ethical approval was obtained from the university's ethical review board of Punjab (293/SPS). The collected data were processed through the statistical package for social sciences (SPSS, version 26.0), and thus appropriate statistical tools were applied for analysis. T-test was used as a statistical comparison of CG and EG in pre and post-test study. Mean was applied for calculating the mean average; thus, Standard deviation (SD) is a widely used measurement of statistical variability. It shows how much variation there is from the average (mean).

## RESULTS

Table 1 shows the anthropometric characteristics of CG before and after Training. Data were expressed by using mean and standard deviation. The total number of subjects was 20. The maximum range in term of age was 17.00; the minimum range was 24.00, and the mean and standard deviation was 20.29±2.70. The maximum range in term of height was 156.00, and the minimum range was 188.00; the mean and standard deviation were 172.55 ±6.32. The maximum range in term of weight before training was 54.00; the minimum range was 92.00, mean and standard deviation was 63.77 ±7.80. The maximum range in term of weight after the post-test was 55.00, and the minimum range was 94.00. The mean and standard deviation was 64.79±7.82.

**Table 1:** Anthropometric analysis of CG during and per test and post-test

| Testing Variables | N  | Max    | Min    | Mean ± SD   |
|-------------------|----|--------|--------|-------------|
| Age               | 20 | 17.00  | 24.00  | 20.29±2.70  |
| Height            | 20 | 156.00 | 188.00 | 172.55±6.32 |
| Weight/Kg/Pre     | 20 | 54.00  | 92.00  | 63.77±7.80  |
| Weight/ Kg/Post   | 20 | 55.00  | 93.00  | 64.79±7.82  |

Table 2 shows the anthropometric characteristics of EG before and after Training. Data were expressed by using mean and standard deviation. The total number of subjects was 20. The maximum range in term of age was 16.00; the minimum range was 23.00, and the mean and standard deviation was 19.29 ±1.70. The maximum range in term of height was 157.00, and the minimum range was 187.00; the

mean and standard deviation were  $171.55 \pm 6.32$ . The maximum range in term of weight before Training was 53.00; the minimum range was 92.00, mean and standard deviation was  $62.77 \pm 6.80$ . The maximum range in term of weight after the post-test was 52.00, and the minimum range was 91.00. The mean and standard deviation was  $61.77 \pm 7.80$ .

**Table 2:** Anthropometric analysis of EG during and pretest and post-test

| Testing Variables | N  | Max    | Min    | Mean $\pm$ SD     |
|-------------------|----|--------|--------|-------------------|
| Age               | 20 | 16.00  | 23.00  | $19.29 \pm 1.70$  |
| Height            | 20 | 157.00 | 187.00 | $171.55 \pm 6.32$ |
| Weight/Kg/Pre     | 20 | 53.00  | 92.00  | $62.77 \pm 6.80$  |
| Weight/ Kg/Post   | 20 | 52.00  | 91.00  | $61.77 \pm 7.80$  |

Table 3 shows the pre-test and post-test analysis of CG. Data were expressed by using mean and standard deviation. The total number of subjects was 20. The mean and standard deviation during the pre-test was  $50.60 \pm 2.35$ , and the mean and standard deviation during the post-test was  $53.05 \pm 2.33$ . t value was 1.788, and Sig was .96. Therefore, the table shows no significant difference in CG in knee-knocking before and after training sessions imposed upon EG. The mean and standard deviation of EG during the pre-test was  $50.00 \pm 2.07$ , and the mean and standard deviation of EG during the post-test was  $58.35 \pm 2.20$ . t value was 17.376, and Sig was .000. Therefore, there was a significant difference during pre and post-test analysis EG in knee-knocking.

**Table 3:** Independent Sample T-test showing the Comparison of both of CG and EG before and after the prescribed time period of exercise

| Testing Variables  | N  | Mean $\pm$ SD (Pre) | Mean $\pm$ SD (Post) | T       | Sign |
|--------------------|----|---------------------|----------------------|---------|------|
| Knee Knocking (CG) | 20 | $53.70 \pm 2.34$    | $53.05 \pm 2.33$     | 1.788   | .096 |
| Knee Knocking (EG) | 20 | $50.00 \pm 2.07$    | $58.35 \pm 2.20$     | -17.376 | .000 |

## DISCUSSION

Results of the study showed that the mean and standard deviation during the pre-test were  $50.60 \pm 2.35$ , and the mean and standard deviation during the post-test was  $53.05 \pm 2.33$ . The t value was 1.788, and Sig was .96. Therefore, the table shows no significant difference in CG in knee-knocking before and after training sessions imposed upon EG. The mean and standard deviation of EG during the pre-test was  $50.00 \pm 2.07$ , and the mean and standard deviation of EG during the post-test was  $58.35 \pm 2.20$ . The t value was 17.376, and Sig was .000. Therefore, there was a significant difference during pre- and post-test EG analysis in knee-knocking. Such an emerging concept is supported by [17] by showing that endurance exercises significantly change body weight, body mass index (BMI), waist-to-hip ratio (WHR), per cent body fat (%BF), or  $VO_2$ max. Likewise,

a combined, structured multidisciplinary intervention for childhood obesity reduces body weight, body mass index and enhanced fitness [18]. The study by Eliakim et al., showed the short- and longer-term benefits of a combined dietary-behavioral-physical activity intervention among obese children [19]. This finding is also in line with the present study's findings. The mean and standard deviation of subjects in terms of Knocked Knee during the post-test was  $6.66 \pm .087$ . The level of Sig was .001, which shows that there is a positive effect of endurance exercise on the Knocked Knee of subjects (P value was  $.001 < \alpha = .05$ ). Finding of the study conducted by Shelbourne and Nitz, supported by the present study indicating accelerated rehabilitation program has been more effective than our initial program in tumbling limitations of motion (particularly knee extension) and loss of strength while maintaining stability and preventing anterior knee pain [20].

## CONCLUSIONS

Based on the analysis, the researcher concluded that exercise has a significant impact on the rehabilitation of the knocked knee. The researcher also concludes that exercises have a considerable impact on rehabilitating lower limb alignment. Based on the findings and conclusion, the researcher recommended that exercise endurance play a vital role in rehabilitating knocked knees. Therefore, endurance exercises should be given to all those subjects having problems with knocked knees. In addition, proper care and early concentration on the part of parents about their children should be given.

## Authors Contribution

Conceptualization: MM

Methodology: AK

Formal analysis: MJ

Writing-review and editing: MZIB, JAS, AB, I, AA

All authors have read and agreed to the published version of the manuscript.

## Conflicts of Interest

The authors declare no conflict of interest.

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