*International Journal of Social Science and Humanities Research-MIYR*
*2026, Volume 6, Issue 1, pp.64~72*
https://doi.org/10.53468/mifyr.2026.6.1.64

# Effects of therapeutic exercises on physical development in students with pathological conditions

**Oyundelger Tserendorj[1], Dolgorsuren Aldartsogt[2*], Bat-Otgon Batsuren[3], Begz Nadmid[4], Lkhamsuren Vanya[5]**

[1]School of Education Studies, Mongolian National University of Education, Mongolia
[2*]School of Biomedicine, Mongolian National University of Medical Science, Mongolia
[3,5]School of Physical Education, Mongolian National University of Education, Mongolia
[4]Academician, Head of Scientific Sub-Assembly for Social Sciences, MAS
*Corresponding Author: Dolgorsuren Aldartsogt, Dolgorsuren.a@mnums.edu.mnv

**CITATION**

Oyundelger Tserendorj, Dolgorsuren Aldartsogt, Bat-Otgon Batsuren, Begz Nadmid, Lkhamsuren Vanya. Effects of therapeutic exercises on physical development in students with pathological conditions. International Journal of Social Science and Humanities Research-MIYR, 2026, 6(1), 64~72. https://doi.org/10.53468/mifyr.2026.6.1.64

**ARTICLE INFO**

Received: 01 March 2026
Revised: 02 March 2026
Accepted: 25 March 2026
Available online: 30 March 2026



**Abstract-** Rapid digitalization and reduced physical activity are associated with poorer physical development and increased non-communicable disease risk among youth. This study examined the effects of therapeutic exercise on students with pathological conditions exempt from physical education. A quasi-experimental single-group pre–post design included 30 secondary students with conditions such as diabetes and hypertension. A nine-month program was conducted twice weekly following the FITT principle. Data were analyzed using paired t-tests and effect sizes ($p < 0.05$). Flexibility improved by 3.70 cm, handgrip strength by 7.50 kg (right) and 6.92 kg (left), and back strength by 17.60 kg. Height and weight increased slightly. Effect sizes were moderate to high. Therapeutic exercise may enhance physical development, though findings are limited by small sample size and lack of a control group.

**Keywords:** Physical activity; Muscle strength; Chronic conditions

## 1. INTRODUCTION

In recent decades, rapid social development and the widespread use of digital technologies to a substantial decline in phusical activity amond children and adolescents. Sedentary lifestyles, prolomged screem time, and reduced participation in organaized phusical activities have been associated with decreased phsycal development and an increased risk on non-communicable diseases at an early age. For this reason physical activity is widely recognized as an essential factor for maintaining physical health, supporting growth and development, and improving overall quality of life [1].

International organizations such as the World Health Organization (WHO), UNESCO, and the International Olympic Committee (IOC) emphasize the importance of integrating regular physical activity into daily life and educational systems as a key strategy for promoting public health. Physical education in schools plays a particularly important role in encouraging active lifestyles and supporting students' physical, psychological, and social development [2][3]. Research has demonstrated that participation in structured physical activity programs can improve muscle strength, flexibility, cardiovascular fitness, and mental well-being among children and adolescents.

However, students with chronic diseases or pathological conditions often face limitations in participating in regular physical education classes [4]. These students may experience reduced physical activity levels due to medical restrictions, fear of injury, or inadequate adaptation of school physical education programs to their health conditions. As a result, they may be at greater risk of physical inactivity, decreased functional

capacity, and reduced physical development compared with their healthy peers [5]. According to the national survey 2025 each participant being graded on how well they could perform givrn tasks, risk factors for non-communicable diseases conducted in Mongolia, 80.2 percent of individuals aged 15–24 received a "C" or lower rating in physical development, indicating insufficient levels of physical activity. Furthermore, the physical development indicators of individuals aged 15–34 were lower than the average level of those aged 35-64, indicating that the problem of physical inactivity is affecting younger age groups [6].

Therapeutic physical exercise has been widely used as an effective approach in rehabilitation and preventive health care. It involves planned and structured movements designed to restore physical function, improve muscle strength, enhance flexibility, and support overall physical performance [7],[8]. Previous studies have shown that therapeutic exercise programs can contribute to improved physical fitness and functional outcomes in children with chronic health conditions. Nevertheless, evidence regarding the effectiveness of therapeutic exercise programs within school settings, particularly for students who are exempt from regular physical education classes, remains limited [9],[10],[11].

Therefore, examining the potential role of therapeutic exercise in supporting the physical development of students with pathological conditions is important for improving inclusive physical education practices and promoting equal opportunities for physical activity among all students.

The purpose of this study was to examine the association between therapeutic exercise and physical development indicators among students with pathological conditions who were exempt from regular physical education classes.

## 2. MATERIALS AND METHODS

This study was conducted using a quasi-experimental research method based on a single-group experimental design. 30 participants highschool students who attend 14$^{th}$ secondary school agreed to take part in the study were included. Inclusion criteria were students enrolled in general secondary schools, diagnosed with chronic diseases, not regularly participating in physical education classes, and voluntarily agreeing to participate in the study the 30 participant's legal guardians were introduced to a consent form in the first week of September in 2024 Participants who refused to participate or were unable to perform therapeutic exercises were excluded.

Participants were informed about the purpose and significance of the study, and after completing the informed consent form, measurements were initiated. First, general information and demographic questionnaires were collected, followed by baseline measurements. Baseline measurements included flexibility, waist circumference, hip circumference, and forearm and back muscle strength. Muscle strength was measured by having participants stand upright without bending their elbows or knees while holding a dynamometer in both hands, with a total of 10 repetitions measured at 5-second intervals.

Afterward, participants were grouped according to the characteristics of their diseases, and using Gentile's classification, therapeutic exercises appropriate to the disease characteristics were selected, taking into account each student's physical and psychological characteristics and environmental influences. Therapeutic exercises tailored to the specific characteristics of each condition were implemented according to the FITT principle,(eg muscle strength, flexibility promoting active movement etc.) starting with simple movements and gradually increasing. The therapeutic exercise program was conducted for nine months, twice per week, according to the students' class schedule. Each session consisted of a 5-minute warm-up followed by 15 minutes of therapeutic exercises.

General recommendations were given to each participant, including performing exercises daily, avoiding exercise when hungry or overly fatigued, starting with low-intensity gentle movements, and stopping immediately if pain increased during exercise. After the study period ended, the initial measurements were repeated, and the results were analyzed by comparing pre-and post-intervention indicators. Statistical analysis: Descriptive statistical analysis was performed on the quantitative data of the research results, and a paired t-test was used to evaluate the differences between pre- and post-measurement indicators. Pearson's correlation coefficient was calculated to determine relationships between variables. An independent t-test was used to evaluate differences between groups, and Cohen's d coefficient was calculated to determine effect size. Statistical analysis was performed using SPSS 25.0 software, and statistical significance was considered at p-value $<0.05$.

## 3. RESULTS

Right hand strength was 17.70±3.17 kg in females and 32.78±7.94 kg in males, left hand strength was 16.72±3.61 kg in females and 31.91±7.71 kg in males, showing relatively greater strength in males. Back strength was 51.46±14.89 kg in females and 99.59±23.94 kg in males, indicating higher muscle strength in males. Waist circumference was 69.46±9.25 cm in females and 73.82±6.64 cm in males, and hip circumference was 86.54±10.65 cm in females and 89.12±6.78 cm in males. (Table 1)

Table 1. Baseline physical characteristics of the study participants (n=30)

| Variable | Female (n=17) Mean ± SD | Male (n=13) Mean ± SD |
|---|---|---|
| Height (cm) | 162.85±4.69 | 173.64±8.14 |
| Weight (kg) | 58.44±10.84 | 64.98±11.71 |
| Flexibility (cm) | 28.89±9.88 | 23.77±7.30 |
| Right hand strength (kg) | 17.70±3.17 | 32.78±7.94 |
| Left hand strength (kg) | 16.72±3.61 | 31.91±7.71 |
| Back strength (κg) | 51.46±14.89 | 99.59±23.94 |
| Waist circumference (cm) | 69.46±9.25 | 73.82±6.64 |
| Hip circumference (cm) | 86.54±10.65 | 89.12±6.78 |

In the post-exercise repeated measurements, females had a height of 165.15±5.03 cm and males had a height of 176.05±7.91 cm, while body weight was 58.96±10.02 kg in females and 68.08±11.99 kg in males. Flexibility increased to 32.35±9.64 cm in females and 27.65±7.28 cm in males. Right hand strength increased to 23.00±4.13 kg in females and 41.96±8.11 kg in males, and left hand strength increased to 20.99±3.45 kg in females and 40.86±7.43 kg in males, indicating improvement in hand strength. Back strength increased to 59.45±14.99 kg in females and 124.54±43.38 kg in males in the repeated measurement. Waist circumference was 69.77±10.25 cm in females and 74.88±7.28 cm in males, while hip circumference was 86.39±12.96 cm in females and 85.82±7.54 cm in males. (Table 2)

Table 2. Post-intervention physical measurements of participants (n=30)

| Variable | Female (n=17) Mean ± SD | Male (n=13) Mean ± SD |
|---|---|---|
| Height (cm) | 165.15±5.03 | 176.05±7.91 |
| Weight (kg) | 58.96±10.02 | 68.08±11.99 |
| Flexibility (cm) | 32.35±9.64 | 27.65±7.28 |
| Right hand strength (kg) | 23.00±4.13 | 41.96±8.11 |
| Left hand strength (kg) | 20.99±3.45 | 40.86±7.43 |
| Back strength (κg) | 59.45±14.99 | 124.54±43.38 |
| Waist circumference (cm) | 69.77±10.25 | 74.88±7.28 |
| Hip circumference (cm) | 86.39±12.96 | 85.82±7.54 |

Using a paired t-test to determine the differences between initial and repeated measurements of all study participants, the mean change in flexibility was 3.70 cm ($t=5.819$, $p<0.001$), right hand strength 7.50 kg ($t=8.810$, $p<0.001$), left hand strength 6.92 kg ($t=9.050$, $p<0.001$), back strength 17.60 kg ($t=3.417$, $p=0.002$), weight 1.98 kg ($t=2.318$, $p=0.028$), and height 2.36 cm ($t=7.771$, $p<0.001$), indicating statistically significant increases in these indicators. However, no statistically significant differences were observed in waist and hip circumference. When determining Cohen's d values between the two measurements, flexibility d=1.06, right hand strength d=1.61, left hand strength d=1.65, back strength d=0.62, weight d=0.42, and height d=1.42 were obtained. (Table 3)

Table 3. Changes in physical indicators after the therapeutic exercise intervention (n=30)

| **Variable** | Mean change ± SD | **95% CI** | **Cohen's d** | **p-value** |
|---|---|---|---|---|
| Height (cm) | 2.36±1.66 | 1.74–2.98 | 1.42 | <0.001 |
| Weight (kg) | 1.98±4.69 | 0.23–3.73 | 0.42 | 0.028 |
| Flexibility (cm) | 3.70±3.48 | 2.40–5.00 | 1.06 | <0.001 |
| Right hand strength (kg) | 7.50±4.66 | 5.76–9.24 | 1.61 | <0.001 |
| Left hand strength (kg) | 6.92±4.19 | 5.36–8.49 | 1.65 | <0.001 |
| Back strength (κg) | 17.60±28.21 | 7.07–28.13 | 0.62 | 0.002 |
| Waist circumference (cm) | 0.73±4.33 | -0.88–2.35 | 0.17 | 0.361 |
| Hip circumference (cm) | -1.93±5.25 | -3.89–0.03 | -0.37 | 0.053 |

When determining the correlation coefficient between post-exercise and initial measurements, the correlation between height and weight was r=0.982 (p<0.001) and r=0.921 (p<0.001), indicating relatively strong relationships. Flexibility r=0.919 (p<0.001), right hand strength r=0.918 (p<0.001), left hand strength r=0.938 (p<0.001), back strength r=0.812 (p<0.001), waist circumference r=0.874 (p<0.001), and hip circumference r=0.853 (p<0.001), showing that all indicators had high correlation with the initial measurements. (Table 4)

Table 4. Correlations between baseline and post-intervantion measurement (n=30)

| **Variable** | **Correlation (r)** | **p-value** |
|---|---|---|
| Height (cm) | 0.982 | <0.001 |
| Weight (kg) | 0.921 | <0.001 |
| Flexibility (cm) | 0.919 | <0.001 |
| Right hand strength (kg) | 0.918 | <0.001 |
| Left hand strength (kg) | 0.938 | <0.001 |
| Back strength (κg) | 0.812 | <0.001 |
| Waist circumference (cm) | 0.874 | <0.001 |
| Hip circumference (cm) | 0.853 | <0.001 |

In males, compared to the initial measurements, statistically significant changes were observed in most indicators in the repeated measurements. The mean differences were height 2.41 cm (p<0.001), weight 3.10 kg (p=0.019), flexibility 3.88 cm (p<0.001), right hand strength 9.18 kg (p<0.001), left hand strength 8.95 kg (p<0.001), back strength 24.95 kg (p=0.011), and hip circumference 3.29 cm (p=0.002), all of which were statistically significant, while waist circumference showed no statistically significant difference (Table 5).

Table 5. Comparison physical indicators among male participants (n=30)

| **Variable** | Mean Change ±SD | **95% CI** | **Cohen's d** | **p-value** |
|---|---|---|---|---|
| Height (cm) | 2.41±1.55 | 1.61–3.20 | 1.17 | <0.001 |
| Weight (kg) | 3.10±4.90 | 0.58–5.62 | 0.48 | 0.019 |
| Flexibility (cm) | 3.88±3.44 | 2.11–5.65 | 0.85 | <0.001 |
| Right hand strength (kg) | 9.18±3.88 | 7.18–11.17 | 1.78 | <0.001 |
| Left hand strength (kg) | 8.95±3.09 | 7.36–10.54 | 2.18 | <0.001 |
| Back strength (κg) | 24.95±35.78 | 6.56–43.35 | 0.52 | 0.011 |
| Waist circumference (cm) | 1.06±2.75 | (-0.35)–2.47 | 0.29 | 0.132 |
| Hip circumference (cm) | 3.29±3.75 | 1.36–5.22 | -0.66 | 0.002 |

A statistically strong correlation was observed between the initial and repeated measurements among males, with height (r=0.982, p<0.001), weight (r=0.915, p<0.001), flexibility (r=0.889, p<0.001), right hand strength (r=0.883, p<0.001), left hand strength (r=0.917, p<0.001), waist circumference (r=0.926, p<0.001), and hip circumference (r=0.868, p<0.001) showing strong correlations in the repeated measurement, while back strength showed a relatively weaker correlation (r=0.565, p=0.018) (Table 6).

Table 6. Correlation analysis of physical measurement among male participants (n=30)

| Variable | Correlation (r) | p-value |
|---|---|---|
| Height (cm) | 0.982 | <0.001 |
| Weight (kg) | 0.915 | <0.001 |
| Flexibility (cm) | 0.889 | <0.001 |
| Right hand strength (kg) | 0.883 | <0.001 |
| Left hand strength (kg) | 0.917 | <0.001 |
| Back strength (кg) | 0.565 | 0.018 |
| Waist circumference (cm) | 0.926 | <0.001 |
| Hip circumference (cm) | 0.868 | <0.001 |

In females, compared to the initial measurements, most indicators showed statistically significant differences in the repeated measurements. Height 2.30±1.86 cm (p=0.001), flexibility 3.46±3.67 cm (p=0.005), right hand strength 5.30±4.82 kg (p=0.002), left hand strength 4.28±4.03 kg (p=0.002), and back strength 7.98±6.30 kg (p=0.001) were statistically significant, while weight 0.52±4.12 kg (p=0.656), waist circumference 0.31±5.91 cm (p=0.854), and hip circumference 0.15±6.47 cm (p=0.933) were not statistically significant (Table 7).

Table 7. Comparison of physical indicators among female participants (n=30)

| Variable | Mean Change ± SD | 95% CI | Cohen's d | p-value |
|---|---|---|---|---|
| Height (cm) | 2.30±1.86 | 1.18–3.42 | 0.81 | <0.001 |
| Weight (kg) | 0.52±4.12 | -3.02–1.97 | 0.08 | 0.656 |
| Flexibility (cm) | 3.46±3.67 | 1.25–5.68 | 0.62 | 0.005 |
| Right hand strength (kg) | 5.30±4.82 | 2.39–8.22 | 0.72 | 0.002 |
| Left hand strength (kg) | 4.28±4.03 | 1.84–6.71 | 0.70 | 0.002 |
| Back strength (кg) | 7.98±6.30 | 4.18–11.79 | 0.83 | <0.001 |
| Waist circumference (cm) | 0.31±5.91 | -3.88–3.26 | 0.03 | 0.854 |
| Hip circumference (cm) | 0.15±6.47 | -3.75–4.06 | -0.02 | 0.933 |

A statistically significant correlation was found between the initial and repeated measurements among females. Height (r=0.929, p<0.001), weight (r=0.925, p<0.001), flexibility (r=0.930, p<0.001), right hand strength (r=0.151, p<0.623), left hand strength (r=0.348, p<0.244), back strength (r=0.911, p<0.001), waist circumference (r=0.821, p<0.001), and hip circumference (r=0.868, p<0.001) all showed strong positive correlations with the repeated measurements

Table 8. Correlation analysis among female participants (n=30)

| Variable | Correlation (r) | p-value |
|---|---|---|
| Height (cm) | 0.929 | <0.001 |
| Weight (kg) | 0.925 | <0.001 |
| Flexibility (cm) | 0.930 | <0.001 |
| Right hand strength (kg) | 0.151 | 0.623 |
| Left hand strength (kg) | 0.348 | 0.244 |
| Back strength (кg) | 0.911 | <0.001 |
| Waist circumference (cm) | 0.821 | <0.001 |
| Hip circumference (cm) | 0.868 | <0.001 |

ANOVA analysis showed no statistically significant difference when comparing the pre- and post-therapeutic exercise measurement values of study participants by disease group.

Table 9. ANOVA comparison of physical indicators by disease group (n=30)

| Variable | Intraclass MC | Class MC | df | F | p (Sig.) |
|---|---|---|---|---|---|
| Height (cm) | 4.532 | 2.563 | 3.26 | 1.768 | 0.178 |
| Weight (kg) | 21.441 | 22.023 | 3.26 | 0.974 | 0.420 |
| Flexibility (cm) | 17.511 | 11.510 | 3.26 | 1.521 | 0.232 |
| Right hand strength (kg) | 9.776 | 23.116 | 3.26 | 0.423 | 0.738 |
| Left hand strength (kg) | 12.620 | 18.080 | 3.26 | 0.698 | 0.562 |
| Back strength (κg) | 738.714 | 802.501 | 3.26 | 0.921 | 0.445 |
| Waist circumference (cm) | 8.586 | 19.927 | 3.26 | 0.431 | 0.733 |
| Hip circumference (cm) | 6.256 | 30.042 | 3.26 | 0.208 | 0.890 |

## 4. DISCUSSION

This study examined the association between therapeutic exercise and changes in physical development indicators among students who were exempt from regular physical education classes due to pathological conditions. The results indicated that participation in the therapeutic exercise program was associated with improvements in several physical indicators, including flexibility, hand strength, and back strength. These findings suggest that structured therapeutic exercise may contribute to maintaining and improving physical fitness among students with health-related limitations.

Our study results also indicated that while most muscle strength and other physical metrics did not show statistically significant differences according to disease group or gender, there was a measurable increase in muscle strength following the therapeutic exercise intervention.

The observed improvements in flexibility and muscular strength are consistent with previous studies reporting that appropriately designed exercise programs can enhance musculoskeletal function and mobility in individuals with limited physical activity. Therapeutic exercise programs that include stretching, strength training, and controlled physical activity may help improve joint mobility and muscle performance, which are essential components of functional physical development.

These findings are consistent with the 2023 study by Eva Sandstedt et al., which involved 54 children with Juvenile Idiopathic Arthritis (JIA). Their research demonstrated improved muscle strength after a 12-week strength-training program [12]. Numerous studies have also shown that physical exercise programs designed to improve muscle strength have positive effects not only on children diagnosed with chronic diseases but also on healthy children. For example, a 2024 study by Carolina Dertzbocher Feil Pinho et al. reported that general physical exercise programs can improve muscle strength by 15–35%, depending on the type, duration, and frequency of the exercise.

However, not all studies have reported statistically significant improvements in muscle strength. A 2024 meta-analysis by Wen-Yu Liu et al. found that although exercise had a positive effect on pain reduction in children with JIA, the increase in muscle strength was not statistically significant, and no significant differences were observed in the restoration of muscle function[13]. The lack of statistically significant differences in some of our indicators is therefore consistent with previous research. This suggests that improvements in muscle strength may depend on factors such as the quality and duration of exercise programs, the specific characteristics of the child's condition, and the type of exercise performed [14]. Similarly, Kristin M. Houghton et al. (2018) reported that although a 6-month specialized exercise program resulted in some improvements in muscle strength, the outcomes were likely influenced by variations in participant engagement and adherence to the exercise protocol [15].

In addition to physical improvements, participation in therapeutic exercise activities may also promote positive psychological and social outcomes. Regular participation in supervised physical activity may encourage social interaction among students and improve confidence and engagement in school activities. These factors may indirectly contribute to students' overall well-being and participation in educational settings.

However, several limitations should be considered when interpreting the results of this study. First, the research was conducted using a single-group quasi-experimental design without a control group. Therefore, it cannot be definitively concluded that the observed improvements were caused solely by the therapeutic exercise intervention. The results should instead be interpreted as associations between participation in the exercise program and changes in physical indicators.

Second, the relatively small sample size (n = 30) limits the statistical power of the study, particularly in subgroup analyses by disease type. Consequently, the findings related to comparisons among disease groups should be interpreted with

caution. Future studies with larger sample sizes and more balanced group distributions are needed to confirm these findings.

Third, although the therapeutic exercise program was based on the FITT principle, a more detailed description of the intervention protocol would strengthen the reproducibility of the study. Future research should provide more comprehensive information regarding exercise type, intensity, frequency, and duration.

Despite these limitations, this study provides preliminary evidence that therapeutic exercise programs may support improvements in physical development indicators among students who are unable to participate in regular physical education classes. Incorporating structured therapeutic exercise into adapted physical education programs may therefore be beneficial for promoting physical health and functional fitness in this population.

Future research should consider randomized controlled study designs, larger sample sizes, and longer intervention periods to better evaluate the effectiveness of therapeutic exercise programs and to clarify their potential impact on both physical and psychosocial outcomes.

## 5. CONCLUSION

The results of this study indicate that participation in a therapeutic exercise program was associated with improvements in several physical development indicators among students with pathological conditions, particularly in handgrip strength, back muscle strength, and flexibility. These findings suggest that therapeutic exercise may provide supportive benefits for students who are unable to fully participate in regular physical education classes.

However, because this study used a single-group quasi-experimental design without a control group and included a relatively small sample size, causal relationships cannot be confirmed. Future research should include larger sample sizes and controlled experimental designs to better evaluate the effectiveness of therapeutic exercise programs in improving the physical development of students with pathological conditions. This study has several limitations. First, the study employed a single-group quasi-experimental design without a control group, which limits the ability to determine causal relationships between the therapeutic exercise program and the observed outcomes. Second, the sample size was relatively small (n = 30), which may reduce the statistical power of subgroup analyses such as comparisons by disease group. Finally, the participants were recruited from a single secondary school, which may limit the generalizability of the findings.

## REFERENCES

[1] Asian Journal of Human Services. (2015). Longitudinal verification of the relationship between psychological, physiological and pathological changes and the outcome of classes. *Asian Journal of Human Services, 9*, 107–117. https://doi.org/10.14391/ajhs.9.107

[2] Lkhamsuren, V., Oyundelger, Ts., & Bat-Otgon, B. (2025). Opportunities to prevent physical inactivity through physical education classes. *Mongolian International Forum of Youth Research, 5*(4), 61–72. https://doi.org/10.53468/mifyr.2025.5.4.61-72

[3] Brittain, I. (2010). The role of schools in constructing self-perceptions of sport and physical education in relation to people with disabilities. *Sport, Education and Society, 15*(1), 75–94. https://doi.org/10.1080/1357332042000175827

[4] Wang, L. (2019). Perspectives of students with special needs on inclusion in general physical education: A social-relational model of disability. *Adapted Physical Activity Quarterly, 36*(2), 242–263. https://doi.org/10.1123/apaq.2018-0068

[5] Medekov, H. (2009). Physical activity and its relationship with selected indicators of somatic, functional and motor development. In *Proceedings of VEGA Research Conference*.

[6] Тунгалаг, Ж. (2008). *Нийтийн биеийн тамирыг бүх нийтийн үйлс болгох асуудал*. Улаанбаатар: Сод Пресс.

[7] Якунин, А. Н., & Кондрашова, Л. А. (2018). *Medical rehabilitation and therapeutic physical training*. St. Petersburg: SpetsLit.

[8] Шойхет, Я. Н. (2012). *ЛФК и массаж: практическое руководство*. Москва: МЕДпресс-информ.

[9] Kisner, C., & Colby, L. A. (2012). *Therapeutic exercise: Foundations and techniques* (6th ed.). F.A. Davis.

[10] Bielecki, M., & Tadi, P. (2023). Therapeutic exercise. In *StatPearls*. StatPearls Publishing. https://www.ncbi.nlm.nih.gov/books/NBK555922/

[11] American Physical Therapy Association. (2014). *Guide to physical therapist practice 3.0*. https://www.apta.org
[12] Sandstedt, E., Fasth, A., Eek, M. N., et al. (2013). Muscle strength, physical fitness and well-being in children and adolescents with juvenile idiopathic arthritis and the effect of an exercise programme: A randomized controlled trial. *Pediatric Rheumatology, 11*, 7. https://doi.org/10.1186/1546-0096-11-7
[13] Liu, W. Y., et al. (2024). Effect of exercise training on health, quality of life and exercise capacity in juvenile idiopathic arthritis: A meta-analysis of randomized controlled trials. *Pediatric Rheumatology, 22*(1), 33. https://doi.org/10.1186/s12969-024-00967-3
[14] Pinho, C. D. F., Bagatini, N. C., Lisboa, S. D. C., et al. (2024). Effects of different supervised and structured physical exercise on the physical fitness trainability of children and adolescents: A meta-analysis and meta-regression. *BMC Pediatrics, 24*, 798. https://doi.org/10.1186/s12887-024-04929-2
[15] Houghton, K. M., Macdonald, H. M., McKay, H. A., et al. (2018). Feasibility and safety of a 6-month exercise program to increase bone and muscle strength in children with juvenile idiopathic arthritis. *Pediatric Rheumatology, 16*, 67. https://doi.org/10.1186/s12969-018-0283-4.

## AUTHOR'S INTRODUCTION

1. First Author

Oyundelger Tserendorj oyundelgertserendorj71@gmail.com

Master's Degree in Educational Studies, Mongolian National University of Education

Work: Teacher, School № 14, Ulaanbaatar, Mongolia
Work field: Physical Education, Rehabilitation / Movement Therapy**)**
Researcher**:** Department of Education Studies and Methodology, School of Education Studies, Mongolian National University of Education

2. Corresponding Author

Dolgorsuren Aldartsogt dolgorsuren.a@mnums.edu.mn

Associate professor M.D, Ph.D

Work: Department of Anatomy, School of Bio-Medicine, Mongolian National University of Medical Sciences

Secretary of MAUTA

3. Co Author

Bat-Otgon Batsuren batotgon@msue.edu.mn

2012 PhD in Educational Studies, Mongolian National University of Education

Work: Associate Professor, Department of Sports, School of Physical Education, Mongolian National University of Education
Work field: Physical Education, Sports biomechanics, Sports training

4. Co Author

Begz Nadmid begznadmid@gmail.com

Head of Scientific Sub-Assembly for Social Sciences, Mongolian Academy of Sciences

5. Co-Author

Lkhamsuren Vanya lsamaday@msue.edu.com

Master's Degree in Medicine

Work: Department of Physical Education and Sports Theory and Methodology, School of Physical Education, Mongolian National University of Education
Work field:Exercise Physiology, Health, and Rehabilitation / Movement Therapy