Narrative Review:
Physical Activity and Exercise Recommendations for Children in Persian Medicine: A Narrative Review

Malihe Tabarrai[1], Monireh Sadat Motaharifard[1], Laila Shirbeigi[1], Reihane Alipour[1], Maryam Sadat Paknejad[1*]

1. Department of Traditional Medicine, School of Persian Medicine, Tehran University of Medical Sciences, Tehran, Iran.

Use your device to scan and read the article online

Citation Tabarrai M, Motaharifard MS, Shirbeigi L, Alipour R, Paknejad MS. Physical Activity and Exercise Recommendations for Children in Persian Medicine: A Narrative Review. Journal of Pediatrics Review. 2020; 8(4):247-254. http://dx.doi.org/10.32598/jpr.8.4.864.1

http://dx.doi.org/10.32598/jpr.8.4.864.1

Article info:
Received: 09 Dec 2019
First Revision: 25 Dec 2019
Accepted: 12 Feb 2020
Published: 01 October 2020

Key Words:
Pediatrics, Child, Exercise, Massage, Complementary therapies, Traditional medicine, Persian medicine, Iranian traditional medicine

ABSTRACT

Context: Persian Medicine (PM) scientists such as Avicenna (980-1037 AD) believed that maintaining health without exercise is impossible. So they have written about special rules and various techniques for the exercise of different groups of people including children. This study aimed to express the PM views about the exercise in children.

Evidence Acquisition: Among the most important references of PM in children's subjects, six books from different centuries were selected. Relevant keywords were used to extract related data. Also, PubMed, Science Direct, and Google Scholar databases were searched up to July 2019 to find common views on physical activity and exercise in children. The extracted materials were thoroughly studied to summarize and categorize to find the main themes.

Results: According to PM, exercise is a broad concept, including massage of the upper and lower limbs from the first hours of life, physical activity like crying for feeding and playing, passive movements such as cradle shaking and swinging, and proper and frequent experience of mental states and five senses such as winning/losing, enjoying, listening to music and looking at fine writings. The intensity of exercise varies in different children. Vigorous exercise in children changes the body composition, results in weakness, or impairs the growth and development. So, according to Avicenna, exercise must be planned individually.

Conclusions: It seems that the principles of PM can help design available, different, enjoyable, and user-friendly exercises for children of all ages.

1. Context

Nowadays, the role of physical activity in maintaining health, preventing diseases, and creating a feeling of wellbeing is well known (1-3). General guidelines have been developed to improve regular physical activity. These guidelines, in addition to principles and procedures for all members of society, deal with the methods for different groups such as the elderly, women, pregnant women, and patients with movement disorders. One of these special groups are children (4-9). Because

** Corresponding Author:*
Maryam Sadat Paknejad, PhD.
Address: *Department of Traditional Medicine, School of Persian Medicine, Tehran University of Medical Sciences, Tehran, Iran.*
Tel: *+98 (912) 4573486*
E-mail: *neurointmed@gmail.com*

of the importance of maintaining the health and vitality of childhood and its impact on disease prevention throughout life, physical activity in childhood is of particular significance (6, 10). Although the world has recently made plans to encourage physical activity among different populations, the significance of exercise and physical activity has long been mentioned in most Persian old books (11, 12).

Avicenna (980-1037 AD), the famous Iranian physician, believed in the prominence of exercise and argued that maintaining health without exercise is impossible (13). In Persian medicine (PM), not only body movements but also strengthening the senses, intellectual, and emotional aspects are considered as exercise and there are special rules and various techniques for the exercise of different groups such as children (13-15). This study aimed to explore PM views about the exercise of children.

2. Evidence Acquisition

This is a review study in which, the PM textbooks are evaluated. In the beginning, six books were selected through the most important references of traditional medicine in children's subjects. These books include Canon of Medicine (13), Mufarrah al-qulub (15), Kholase-al-Hekmah (14), Hefz al-Sehe Nasseri (16), Tadbir al-hobali val atfal va-sebyan (17). To ensure achieving the best results, we tried to select books from different centuries. The terms 'Riazat,' 'Harekat,' 'Koodak,' and other words related to the subject were used as the keywords. In the next stage, we started by through, line by line reading of the extracted notes according to keywords and concepts were defined and coded. Therefore, we took notes about the topics related to the exercise of both children and adults and child care. The materials extracted by the authors were summarized and categorized and each category was put under one title. Also, the search has been done in databases of PubMed, Science Direct, and Google Scholar up to July 2019 to find common views on physical activity and exercise in children. The keywords were "exercise", "physical activity", and "movement" with the words "child" and "children". Finally, the related results were classified and readout repeatedly by authors to find the main themes.

3. Results

Exercise concept and its importance in Persian Medicine

In the works of Avicenna and other Persian medicine philosophers, exercise has a wider sense than physical activity. From their perspective, useful training to strengthen the senses, thinking, and emotion are also called exercise (13, 18). For example, listening to beautiful music is an appropriate exercise to strengthen the sense of hearing, psychiatric power, and emotion, or reading the fine writings is another exercise to strengthen the visual acuity (13).

Based on the PM literature, exercise is not only beneficial to health but also the achievement of health is not possible without it (13). Some obvious ways to dispose of the waste materials of digestion and metabolism in the body are excretion in the stool, urine, perspiration, and evaporation from the skin. But in the opinion of the wise, these ways are not sufficient enough for proper sanitation. Exercise is the last solution for disposing of the waste materials (15). That's why traditional medicine physicians believed that exercise seriously affects the daily routine of children (19).

Planning the exercise individually in Persian medicine

Vigorous exercise in children changes their body composition resulting in weakness or impairing the growth and development. The intensity of exercise varies in different children. Environmental conditions, season, and temperament of the child should be observed properly. For example, in the hot season and warm places, less exercise and physical activity is recommended or they should play in moderate cool places (19). Based on the 'Humoral Theory,' the human body consists of fundamental humors called blood (sanguine), yellow bile (Safra), black bile (soda or melancholy), and phlegm. Each humor has a specific quality and quantity. Four qualities of warmth, cold, moisture, and dryness should be presented proportionately in all body's materials and cells. PM scientists believe that any change in the quality or quantity of humors can cause a group of a disease called 'Sue-mizaj' or 'dystemperament' (13, 20). Children with warm and dry dystemperament are very thin, hyperactive, underweight with low appetite. There are very specific orders for taking care of them. This group of children should receive a special recipe for their daily diet, playing in a moderate cool environment, and avoiding intense or extreme exercise (13).

Types of exercise in PM

In most PM books, there's a chapter about children's lifestyles which contains exercise in children. This evidence includes massage, physical activity, passive movement, and proper and frequent experience of mental states and the senses.

Figure 1. An example of upper extremities massage

Massage after bath

According to Avicenna, the need for exercise to keep health is emphasized from the first hours of life. In the delivery room, after washing and drying the baby, stretching and massage must be done for the baby (13). Two types of massage are recommended for this stage: one is done mostly by upper limbs and the other with lower limbs.

Massage of upper limbs

- Baby is placed in a prone position and the palms of both hands are gently brought back down to the waistline (13) (Figure1).

- Baby is placed in a prone position and the palms of both hands are gently brought to the back of the head (15).

- Baby is placed in a supine position, the palm of the right hand is put on the left shoulder and the palm of the left hand on the right shoulder thereby slowly conducting the baby's hands to the back, so it seems that the baby holds something in his/her arms (14).

Massage of lower limbs

- Baby is placed in a prone position, both legs are pulled smoothly and then are bent at knees, gently soles of feet are getting close to buttocks (14, 15) (Figure 2).

- Baby is placed in a prone position, gently soles of feet are getting close to the back of the head (13).

Each of these movements should be repeated several times and all these movements should be done slowly and gently to prevent any harm and damage to the baby (13-15).

Figure 2. An example of lower extremities massage

In PM resources, it is suggested that this kind of exercise should be continued after birth and could be placed in a child's program after each bath. For older children, less bathing and increasing the amount and intensity of physical activity is recommended (14, 19).

Avicenna's daily program for these children is as follows:

- Bathing with lukewarm water after waking up plus massage,

- Playing with children and his peers who are similar in terms of strength for an hour,

- Playing or sleeping in the children's desire,

- Bathing or washing some parts of the body with lukewarm water plus massage,

- Feeding (13).

Physical activity

Crying for feeding: According to PM literature, baby crying for feeding, as physical activity is similar to other types of exercise. A little crying usually happens when the baby is hungry. From this perspective, moderate crying moves the crying baby's organs and warm up the brain's temperament, therefore strengthens it and causes better disposal of waste products from the brain (17). It should be noted that the scientists insist that just a small amount is enough before feeding for achieving the benefits of crying and mother should not remain unresponsive to the needs of children (18).

Playing: Ancient Iranian scientists believe that playing games are a kind of physical activity. They also emphasize that playing not only strengthens the muscles but also empowers the sensual and emotional abilities properly (15). From their perspective, sports and games with their healthy competitions and the possibility of defeat and victory are very effective in strengthening the emotional aspect. They insist that children should play with friends at the same age and playing with a smaller or larger age category is not recommended because it makes them unable to fulfill all their talents (14).

When the children find the ability to walk and run, we have to let them run and play on soft ground (15) and should not prevent them from running, except when it makes them struggling and sweating more than usual (19). Other suitable exercises for children are clapping, jumping, playing with the ball, hide-and-seek, and so on (19).

Passive movements

Cradle: Avicenna and Jorjani believed that moving the baby in the cradle strengthens and empowers the body and its functions and helps to excrete waste products so it is a kind of exercise (13, 18). It is recommended the use of cradle in the daily schedule only 3 to 5 days after birth. Severe shaking and rocking fast should be prevented, especially when the child has just eaten milk because it may cause improper digestion and dyspepsia (14, 15).

Shaking children: Movements such as shaking the baby even while in their caregiver's arms, throwing them up, picking up and laying down, seem to be completely passive activities but they have their benefits of exercise on children's health (17).

Swinging: In PM literature, swinging is a kind of light exercise that has been emphasized in children, the elderly, and those recovering from illness, more than others. Scientists in traditional medicine believe that signals of swinging are similar to physical activity effects and improve blood circulation and waste excretion. Furthermore, swinging can also improve appetite (15).

Proper and frequent experience of mental states and the five senses

In sports competitions which emotions such as winning or losing are involved, training for sensory and emotional aspects are also considered in addition to empowering motor skills (14). Therefore, group games with the design and implementation of such sports are very useful for children.

Avicenna recommends that along with shaking cradle, a pleasant voice singing lullabies could be provided for children. In this case, the gentle rocking motion is a physical movement for the body, and enjoying pleasant sound is a useful exercise for psychiatric and mental power (18). Additionally, listening to music is an exercise for hearing and gradually prepares children to receive music education (13), because PM scientists believed that children had great potential ability to learn music (17).

Reading the fine writings as an exercise to strengthen the visual acuity is recommended in PM, (13); however, they insist that permanent use of this exercise is harmful to the eyes (15). In five systematic reviews, the benefits of regular exercise in early childhood and school-age

children were reduced adiposity and improved cardiometabolic health, muscular strength, and endurance, bone health, cognitive development and performance, and psychosocial health (10, 21-24).

With the precise study of the definition and examples of exercise in PM, it seems that the concept of exercise in this school of medicine is very broad, including massage, passive movements, physical activity, and proper and frequent experience of mental states and the five senses.

According to Avicenna, benefits of exercise include the excretion of waste products of digestion and metabolism in the body, innate heat rise, strengthen joints and ligaments, improve organs' functions, helping better absorption of nutrients, the flexibility of limbs, opening the pores of the skin and causing waste materials disposal (25).

It seems that today, the benefits of exercise are similar to what has been mentioned by Avicenna several centuries ago.

Mayo Clinic and the US Department of Health and Human Services recommended that planning exercise for children should be according to their interests and abilities (6, 7). According to Avicenna, exercise must be planned individually (26). In 'Humoral Theory,' the human body consists of 4 fundamental humors. These humors have specific qualities and quantities in the body. These 4 qualities are warmth, cold, moisture, and dryness. In the human body, each of these qualities creates special properties. For example, the dominancy of moisture results in losing the current shape of materials very easily, and dryness results in difficulty of accepting any changes in the current shape of materials (20).

Heavy exercise in children changes the body composition toward being warm and too dry so that the essential matters will be disposed and it may cause weakness or impair the growth and development, so vigorous exercise for professional sports is not permissible for children (27). For example, children with warm and dry Sue-mizaj are very thin, hyperactive, underweight with low appetite. This group of children should play in a moderate cool environment and avoid intense or extreme exercise (13).

In traditional medical books, massage and passive exercise are considered from the first hours of birth. This issue reflects the importance of physical activity in PM. Mainly, these movements are composed of motion exercises, gentle compression, and hands-on techniques. New studies in preterm and low-weight babies show that the motion exercises and massage have a good influence on weight gain; decreased risk of neonatal sepsis, neonatal stress, jaundice; increased interactions with parents; improved brain and neurodevelopment; increased bone mineral content, bone turnover markers, and body mass (28-34). The potential underlying mechanisms for these effects have been recently studied. A study reported that two-way passive motion of knees in neonates increased oxyhemoglobin and total hemoglobin in the primary sensorimotor areas (35).

In another study, 30 preterm infants were randomly assigned to two groups of massage therapy and exercise group. The intervention was performed for 5 days and every day for 10 minutes. It was observed that exercise and massage led to weight gain. The authors of the article suggested that the possible mechanisms of this phenomenon include changes in parasympathetic tone, increased levels of insulin, and growth hormone (30).

Traditional medicine scientists believe that listening to good music can be considered as a kind of exercise for children. In a study conducted in 1999 by Sakatani and his colleagues, it had been shown that stimulation of the bilateral frontal lobe through listening to music in infants increased blood oxygenation in the brain (10). Another study mentioned that listening to music improved heart rate in hospitalized premature infants (36). Accordingly, it seems that listening to music has similar effectiveness as exercise and physical activities in the brain and heart.

In Southeast Asian countries such as Iran, China, India, and Malaysia the use of cradle has been and is conventional. Swinging and cradle are usually enjoyable activities for children and these activities could have the same advantages as exercise. Given the shortage of the data and the weak quality of available evidence, future research is needed to strengthen the evidence in this topic (37-39).

5. Conclusions

A review of the literature in PM shows that scientists highly value children's exercise and it seems that principles of traditional medicine of Iran can help design available, different, enjoyable, and user-friendly exercises for children of all ages.

Ethical Considerations

Compliance with ethical guidelines

All ethical principles are considered in this article. The participants were informed about the purpose of the research and its implementation stages; they were also

assured about the confidentiality of their information; moreover, they were free to leave the study whenever they wished, and if desired, the research results would be available to them.

Funding

This research did not receive any specific grant from funding agencies in the public, commercial, or non-profit sectors.

Authors' contributions

Conceptualization, Investigation, and Writing the original draft: Maryam Sadat Paknejad, Monireh Sadat Motaharifard, and Reihane Alipour; Methodology, Writing, review, and editing: Malihe Tabarrai and Laila Shirbeigi; Reading and approving the final manuscript: All authors.

Conflicts of interest

The authors declared no conflict of interest.

Acknowledgements

The authors gratefully acknowledge Department of Traditional Persian Medicine, School of Persian Medicine, Tehran University of Medical Sciences.

References

1. American Heart Association. Daily tips to help keep your family active [Internet]. 2020 [Updated 2017 November 16]. Available from: https://www.heart.org/en/healthy-living/fitness/getting-active/daily-tips-to-help-keep-your-family-active

2. Ortega FB, Ruiz JR, Castillo MJ, Sjöström M. Physical fitness in childhood and adolescence: A powerful marker of health. International Journal of Obesity. 2008; 32(1):1-11. [DOI:10.1038/sj.ijo.0803774] [PMID]

3. Pate RR, Pratt M, Blair SN, Haskell WL, Macera CA, Bouchard C, et al. Physical activity and public health. A recommendation from the Centers for Disease Control and Prevention and the American College of Sports Medicine. JAMA. 1995; 273(5):402-7. [DOI:10.1001/jama.1995.03520290054029] [PMID]

4. U.S. Department of Health and Human Services. Physical activity guidelines for Americans [Internet]. 2008. Available from: https://health.gov/sites/default/files/2019-09/paguide.pdf

5. CQUniversity. National physical activity recommendations for children 0–5 years. Commonwealth of Australia. Canberra: ACT; 2013. https://www.10000steps.org.au/articles/national-physical-activity-recommendations-children-0-5-years/#:~:text=For%20health%20development%20in%20infants,hours%2C%20spread%20throughout%20the%20day.

6. Laskowski ER. How much exercise a day do children need? [Internet]. 2019. [Updated 2019 May 17]. Available from: https://www.mayoclinic.org/healthy-lifestyle/fitness/expert-answers/kids-and-exercise/faq-20058336

7. Piercy KL, Troiano RP, Ballard RM, Carlson SA, Fulton JE, Galuska DA, et al. The physical activity guidelines for Americans. JAMA. 2018; 320(19):2020-8. [DOI:10.1001/jama.2018.14854] [PMID]

8. Tremblay MS, Leblanc AG, Carson V, Choquette L, Connor Gorber S, Dillman C, et al. Canadian physical activity guidelines for the early years (aged 0-4 years). Applied Physiology, Nutrition, and Metabolism. 2012; 37(2):345-69. [DOI:10.1139/h2012-018] [PMID]

9. Vehrs PR. Physical activity and strength training in children and adolescents: An overview [Internet]. 2020. [Updated 2020 Jun 25]. Available from: https://www.uptodate.com/contents/physical-activity-and-strength-training-in-children-and-adolescents-an-overview

10. Janssen I, Leblanc AG. Systematic review of the health benefits of physical activity and fitness in school-aged children and youth. The International Journal of Behavioral Nutrition and Physical Activity. 2010; 7:40. [DOI:10.1186/1479-5868-7-40] [PMID] [PMCID]

11. Qaraaty M, Kamali SH, Hashem Dabaghian F, Zafarghandi N, Mokaberinejad R, Mobli M, et al. Effect of myrtle fruit syrup on abnormal uterine bleeding: A randomized double-blind, placebo-controlled pilot study. DARU Journal of Pharmaceutical Sciences. 2014; 22(1):45. [DOI:10.1186/2008-2231-22-45] [PMID] [PMCID]

12. Tipton CM. The history of "Exercise Is Medicine" in ancient civilizations. Advances in Physiology Education. 2014; 38(2):109-17. [DOI:10.1152/advan.00136.2013] [PMID] [PMCID]

13. Ibn-e-Sina AH. Al-Qanun fi-Tteb [The Canon of Medicine]. Beirut: Alaalami Beirut library Press (Research of Ebrahim Shamsedine); 2005.

14. Aghili Alavi MH. Kholase al-Hekmah. Qom: Research Institute for Islamic and Complementary Medicine; 2006.

15. Chaghmini M. Mofarreh al Gholub, 1st ed. Iran: Almaee; 2012.

16. Naser al-Hokama A. Hefz al-Sehe. Iran University of Medical Science; 2003.

17. Baldi A. Tadbir al-Hobali val Atfal va-Sebyan. Baqdad: Dar-orashid; 1980.

18. Jorjani E. Zakhireh-e-Kharazmshahi; 2009.

19. Bahaodoleh B. Kholasat-al-Tajareb. Tehran: Research Institute for Islamic and Complementary Medicine; 2004.

20. Tabarrai M, Eftekhar T, Nazem E. Etiology of the vaginal, cervical, and uterine laceration on Avicenna viewpoints. Iranian Journal of Public Health. 2013; 42(8):927-8. https://ijph.tums.ac.ir/index.php/ijph/article/view/4408

21. Strong WB, Malina RM, Blimkie CJR, Daniels SR, Dishman RK, Gutin B, et al. Evidence based physical activity for school-age youth. The Journal of Pediatrics. 2005; 146(6):732-7. [DOI:10.1016/j.jpeds.2005.01.055] [PMID]

22. Carson V, Hunter S, Kuzik N, Wiebe SA, Spence JC, Friedman A, et al. Systematic review of physical activity and cognitive development in early childhood. Journal of Science and Medicine in Sport. 2016; 19(7):573-8. [DOI:10.1016/j.jsams.2015.07.011] [PMID]

23. Carson V, Lee EY, Hewitt L, Jennings C, Hunter S, Kuzik N, et al. Systematic review of the relationships between physical activity and health indicators in the early years (0-4 years). BMC Public Health. 2017; 17(Suppl 5):854. [DOI:10.1186/s12889-017-4860-0] [PMID] [PMCID]

24. Gómez-Bruton A, Matute-Llorente Á, González-Agüero A, Casajús JA, Vicente-Rodríguez G. Plyometric exercise and bone health in children and adolescents: A systematic review. World Journal of Pediatrics. 2017; 13(2):112-21. [DOI:10.1007/s12519-016-0076-0] [PMID]

25. Modanlou HD. Medical care of children during the golden age of Islamic medicine. Archives of Iranian Medicine. 2015; 18(4):263-5. [PMID]

26. Çetkin M, Bahsi I, Orhan M. Evaluation of exercise in canon of medicine. Archives of Iranian Medicine. 2016; 19(10):743-6. [PMID]

27. Siahposh MB. [Exercise in Iranian traditional medicine (Persian)]. Tehran: Niakan; 2013. http://opac.nlai.ir/opac-prod/bibliographic/3217432

28. Álvarez MJ, Fernández D, Gómez-Salgado J, Rodríguez-González D, Rosón M, Lapeña S. The effects of massage therapy in hospitalized preterm neonates: A systematic review. International Journal of Nursing Studies. 2017; 69:119-36. [DOI:10.1016/j.ijnurstu.2017.02.009] [PMID]

29. Cleveland L, Hill CM, Pulse WS, DiCioccio HC, Field T, White-Traut R. Systematic review of skin-to-skin care for full-term, healthy newborns. Journal of Obstetric, Gynecologic, and Neonatal Nursing. 2017; 46(6):857-69. [DOI:10.1016/j.jogn.2017.08.005] [PMID]

30. Diego MA, Field T, Hernandez-Reif M. Preterm infant weight gain is increased by massage therapy and exercise via different underlying mechanisms. Early Human Development. 2014; 90(3):137-40. [DOI:10.1016/j.earlhumdev.2014.01.009] [PMID] [PMCID]

31. Field T, Diego M, Hernandez-Reif M. Preterm infant massage therapy research: A review. Infant Behavior & Development. 2010; 33(2):115-24. [DOI:10.1016/j.infbeh.2009.12.004] [PMID] [PMCID]

32. Juneau AL, Aita M, Heon M. Review and critical analysis of massage studies for term and preterm infants. Neonatal Network. 2015; 34(3):165-77. [DOI:10.1891/0730-0832.34.3.165] [PMID]

33. Moyer-Mileur LJ, Brunstetter V, McNaught TP, Gill G, Chan GM. Daily physical activity program increases bone mineralization and growth in preterm very low birth weight infants. Pediatrics. 2000; 106(5):1088-92. [DOI:10.1542/peds.106.5.1088] [PMID]

34. McQueen D, Lakes K, Rich J, Vaughan J, Hayes G, Cooper D, et al. Feasibility of a caregiver-assisted exercise program for preterm infants. The Journal of Perinatal & Neonatal Nursing. 2013; 27(2):184-92. [DOI:10.1097/JPN.0b013e31828b244a] [PMID] [PMCID]

35. Isobe K, Kusaka T, Nagano K, Okubo K, Yasuda S, Kondo M, et al. Functional imaging of the brain in sedated newborn infants using near infrared topography during passive knee movement. Neuroscience Letters. 2001; 299(3):221-4. [DOI:10.1016/S0304-3940(01)01518-X]

36. Van der Heijden MJE, Oliai Araghi S, Jeekel J, Reiss IKM, Hunink MG, van Dijk M. Do hospitalized premature infants benefit from music interventions? A systematic review of randomized controlled trials. PLoS One. 2016; 11(9):e0161848. [DOI:10.1371/journal.pone.0161848] [PMID] [PMCID]

37. Arnold JC, Burkholder B, Stella A, Rivera M. Child containment system with multiple infant support modes. Google Patents; 2018. https://patents.google.com/patent/US9414694

38. Hionakis A. Infant swing. US Patent App. 15/619,540; 2018.

39. Dinkel D, Snyder K, Patterson T, Warehime S, Kuhn M, Wisneski. An exploration of infant and toddler unstructured outdoor play. European Early Childhood Education Research Journal. 2019; 27(2):257-71. [DOI:10.1080/1350293X.2019.1579550]

This Page Intentionally Left Blank