



CDSIMER
Dr. Chandramma Dayananda Sagar
Institute of Medical Education and Research



Dayananda Sagar
University

ORTHOPAEDIC DEPARTMENT NEWSLETTER

(LEARNING IS CONTINUOUS)

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Message from The Editor

At the outset I would like to thank Dr A C Ashok , Dean & Principal for accepting our request to start this newsletter. Dr Madan Gaekwad , Special Administrative officer for encouraging our efforts and Special thanks to Dr S Rajagopalan , Medical Director & Vice Principal for valuable guidance in bringing out this first edition.

Main idea behind this newsletter is to report the works done in our Department and provide a platform for our colleagues to express their academic & non-academic talents.

In this first edition, I have tried to give a comprehensive outlook on exercise for health & fitness which throws light on the science behind different dimension of exercise for wellness.

I also take this opportunity to extend a hearty welcome to entire teaching & nonteaching staff of CDSIMER to our "NATIONAL BONE & JOINT DAY" on 4th August 2021. I wish you a healthy & prosperous year ahead.

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EXERCISE FOR HEALTH AND FITNESS

1. EXERCISE:

“Activity requiring physical effort, carried out to sustain or improve health and fitness”

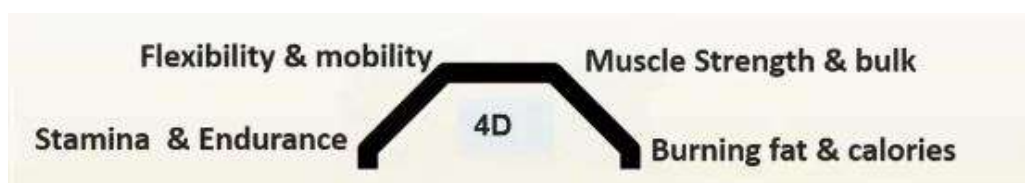
- ‘Any exercise’ is a stress reliver
- ‘Any exercise’ will lubricate some joints to a certain extent
- Any exercise is better than no activity, in that, it will give a sense of well-being but many not give any metabolic benefit as commonly mistaken.
- Reported ‘benefit’ may be a placebo effect in many cases

2. FOUR DIMENSIONS OF SCIENTIFIC FITNESS

Most people tend to focus on one type of exercise or activity and think they are doing enough. Research has shown that it is important to get all four types of exercise: endurance, strength, balance, and flexibility. Each one has different benefits. Doing one kind also can improve your ability to do the others, and variety helps reduce boredom and risk of injury. No matter what your age is you can find activities that meet your fitness levels and needs.

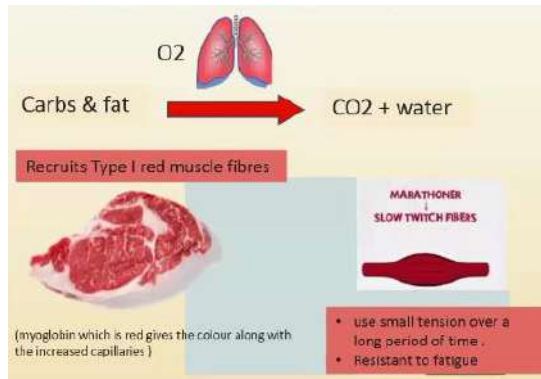
- Endurance
- Strength
- Balance
- Flexibility

4 DIMENSIONS OF EXERCISES



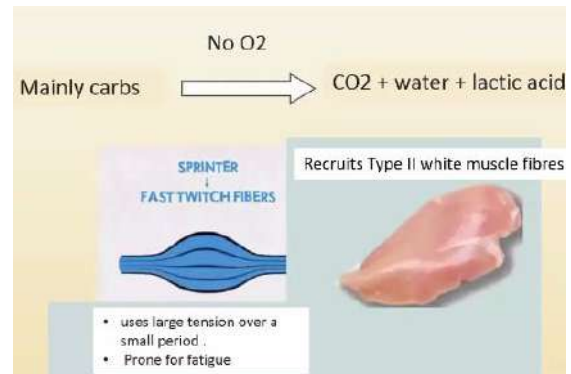
3. TWO TYPES OF METABOLISM & TWO DIFFERENT MUSCLE FIBER TARGETS

AEROBIC EXERCISE



- Also known as endurance activities, **cardio**, or **cardio-respiratory exercise**
- "Aerobic" is defined as "relating to, involving, or requiring free oxygen"
- Aerobic exercise may be better referred to as "solely aerobic", as it is designed to be low intensity enough for all carbohydrates to be aerobically turned into energy via mitochondrial ATP production
- The slow twitch fibers generate energy for ATP re-synthesis by means of a long term system of aerobic energy transfer. Fibers that become slow twitch develop greater numbers of mitochondria and capillaries making them better for prolonged work.
- Examples: running or jogging, swimming, cycling, stair climbing and walking.

ANAEROBIC EXERCISE



- A type of exercise that breaks down glucose in the body without using oxygen; *anaerobic* means "without oxygen." In practical terms, this means that anaerobic exercise is more intense, but shorter in duration than aerobic exercise.
- Lactic acid is produced at an increased rate during anaerobic exercise, causing it to build up quickly- leads to muscle soreness
- The fast twitch fibers rely on a well-developed, anaerobic, short term, glycolytic system for energy transfer and can contract and develop tension at 2–3 times the rate of slow twitch fibers. Fast twitch muscles are much better at generating short bursts of strength or speed than slow muscles, and so fatigue more quickly
- Examples: sprints, high-intensity interval training (HIIT), and strength training.

4. CARDIO- LISS- LOW INTENSITY STEADY STATE – AEROBIC METABOLISM

Endurance activities, often referred to as aerobic, increase your breathing and heart rates. These activities help keep you healthy, improve your fitness, and help you perform the tasks you need to do every day. Endurance exercises improve the health of your heart, lungs, and circulatory system. They also can delay or prevent many diseases that are common in older adults such as diabetes, colon and breast cancers, heart disease, and others.

Physical activities that build endurance includes



- As name suggests , improves cardio vascular health
- The only way to build stamina & endurance
- Good for burning calories (not the best)
- Great for relieving stress and socializing outdoors (endorphins)
- Excellent to improve joint function

Limitation of LISS (cardio)

- Does not recruit the type 2 fast muscle fibers
- Quick adaptability – have to keep increasing for same effect
- Selectively overdoing cardio (marathon runners) now proven to be deleterious to health
- Has very limited capacity to improve strength
- Doing only cardio is very inadequate for health (commonest mistake)

5. EXERCISE WITH RESISTANCE AND WEIGHTS- ANAEROBIC METABOLISM



Your muscular strength can make a significant difference. Strong muscles help you stay independent and make everyday activities feel easier, like getting up from a chair, climbing stairs, and carrying groceries. Keeping your muscles strong can help with your balance and prevent falls and fall-related injuries. You are less likely to fall when your leg and hip muscles are strong. Some people call using weight to improve your muscle strength “strength training” or “resistance training.”

Some people choose to use weights to help improve their strength. If you do, start by using light weights at first, then gradually add more. Other people use resistance bands, stretchy elastic bands that come in varying strengths. If you are a beginner, try exercising without the band or use a light band until you are comfortable. Add a band or move on to a stronger band (or more weight) when you can do two sets of 10 to 15 repetitions easily. Try to do strength exercises for all your major muscle groups at least 2 days per week, but do not exercise the same muscle group on any 2 days in a row.

- Only exercise that recruits type 2 peripheral muscle fibres. (Twitching can be felt at times when type 2 fibres are recruited).
- Most efficient way to build strength and bulk of muscle.
- Toning and shaping of muscle occurs
- It would suffice to do 2- 3 times / week

Limitations of exercises with resistance & weights

- Recruitment of type 1 slow fibers less
- Does not build stamina & endurance.
- Can produce some muscle pain due to lactic acid (muscle burn)

6. HIGH INTENSITY INTERVAL TRAINING: HIIT

Fartlek, a Swedish term that means "speed play,"



It was first noted in Sweden that periods of very fast running intermixed with periods of very slow running gave different benefits than running at a steady moderate pace

ADVANTAGES:

- RECRUITS **BOTH** AEROBIC AND ANAEROBIC METABOLISM
- **BDNF** (BRAIN DERIVED NEUROTROPHIC FACTOR)- COGNITIVE CONTROL AND WORKING MEMORY CAPACITY
- SIGNIFICANTLY **LOWERS INSULIN RESISTANCE**
- FAT OXIDATION- REDUCES **RESILIENT FAT**

- ✓ Tremendously time efficient , 15 mts equals 1 hr. of cardio
- ✓ Protects muscle unlike cardio. Therefore more selective fat burner
- ✓ Most efficient in calorie burning for time spent
- ✓ Two times a week is sufficient
- ✓ Effect lasts much later after finishing an HIIT workout **EPOC**



Any stationary exercise can be made into a HIIT routine . It is the principle that matters

7. FLEXIBILITY, MOBILITY, CORE & BALANCE:

Stretching can improve your flexibility. Moving more freely will make it easier for you to reach down to tie your shoes or look over your shoulder when you back your car out of the driveway.

Balance exercises help prevent falls, a frequent problem in older adults that can have serious consequences. Many lower-body strength exercises also will improve your balance

Flexibility is defined as "the ability of a muscle or muscle groups to lengthen passively through a range of motion", Function of muscle is not brought into consideration. This is just stretching

Mobility is the "ability of a joint to move actively through a range of motion". and maintain form. Muscular function is also brought to play. Posture has to be maintained for some time

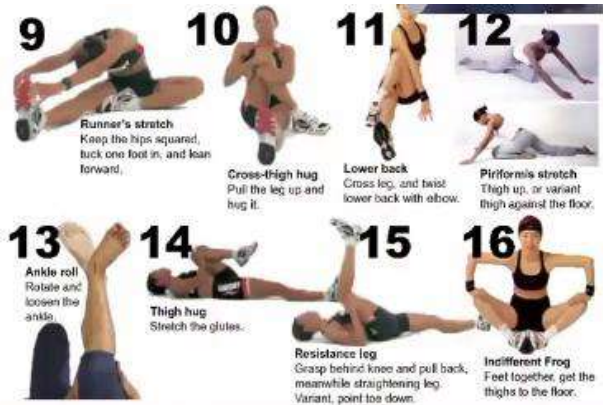
Importance of stretching

- Stretching decreases muscle stiffness and increases range of motion.
- Reduce your risk of injury in both repetitive and resistance exercise
- Improves posture and prevents lethargy & inertia
- Promotes circulation.
- Helps relieve post-exercise aches and pains.

No need for doing repetitions in stretching or mobility routines



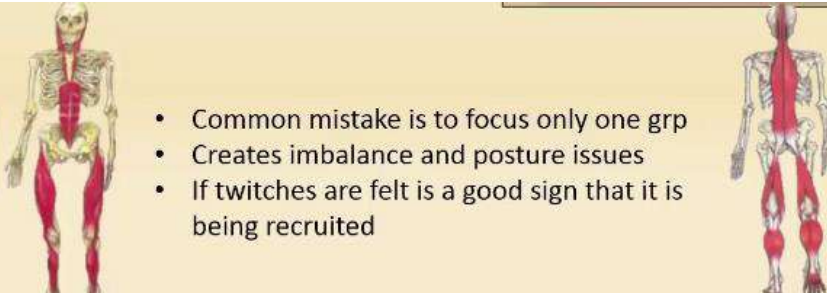
8 basic stretches sitting



Or SURYA NAMASKAR to stretch all joints in body in one go,



8. COMMON STATIC POSTURES FOR MOBILITY



Muscles in the front of body is ant. chain

- Common mistake is to focus only one grp
- Creates imbalance and posture issues
- If twitches are felt is a good sign that it is being recruited

Muscles in the back of body is post. chain



Plank

Reverse Plank

Boat pose

Bridge

Superman hold

HOLLOW BODY HOLD


Cobra pose

Fetal pose

SIDE PLANK

9. CORE BALANCE

The core of the Core



The area of the **body**, which is commonly referred to as the **core**, is **your** midsection and it involves all **your** muscles in that area including the front, back and sides.

- The Core is the Foundation of the body from a functional standpoint
- All compound movements of the body originates from the core or passes through it.
- A strong flexible core underpins all everyday activities like standing, walking, sitting, and doing any work @ home or workplace
- Weak core will impair not only the spine but also your upper and lower limbs function
- A strong Core enhances balance, stability, posture and improves breathing
- Prevents injury during day to day activities, exercising & sport
- Weak core is the commonest cause of chr. Back pain.
- Risk of injury present if other exercises are initiated with a weak core


Core strengthening involves

- ❖ Static Mobility poses
- ❖ Dynamic Exercises
- ❖ Maintaining posture at all times





10. DYNAMIC CORE STRENGTHENING:


Classic crunch




Spinal arching



Bicycle



Mountain climbers

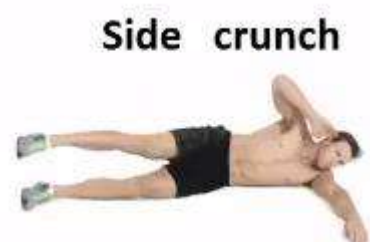


Leg raises



Alternate leg pull





MINIMUM 20 -30 REPETITIONS REQUIRED

11. IMPORTANCE OF BALANCE EXERCISE

- reversing age-related loss of balance
- preventing falls
- building better posture & core
- Improves core stability



Standing on one leg is the most basic of balance . Can be practiced while doing everyday chores .

If done with eyes closed will engage the vestibular system more.



Stork

Flamingo

3 Key Basic postures







Warrior 3

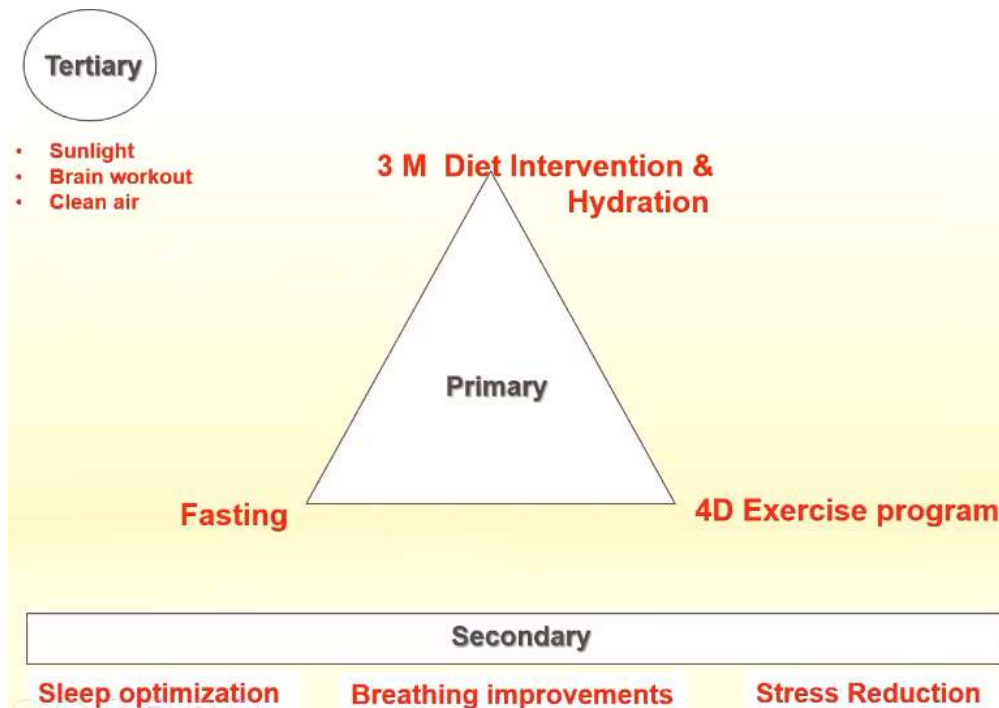
12. BALANCED EXERCISE PROGRAM:

Increase your endurance or “staying power” to help keep up with your grandchildren during a trip to the park, dance to your favourite songs at a family wedding, and rake the yard and bag up leaves. Build up to at least **150 minutes** of activity a week that makes you breathe hard. Try to be active throughout your day to reach this goal and avoid sitting for prolonged periods of time.

A sample schedule that includes all components for a Balanced Exercise Program that is as crucial as A Balanced Diet

	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
Morning approx. 10 mts	REST	Stretching & Mobility routine	Stretching & Metabolic conditioning	Stretching & Mobility routine	Stretching & Metabolic conditioning	Stretching & Mobility routine	Stretching & Metabolic conditioning
Evening approx. 40 mts	REST	Cardio 	Resistance & weight training 	HIIT Fat burning	Cardio 	Resistance & weight training 	HIIT Fat burning

13. COMPREHENSIVE SCIENTIFIC TEMPLATE FOR WELLNESS



REFERENCES:

1. "HIIT FAQ (Frequently Asked Questions about High-Intensity Interval Training)". DOHIIT. Retrieved 2017-08-25
2. Marvellous medicine: Understanding exercise and optimising it for maximum benefit.
3. *Di Donato, Danielle; West, Daniel; Churchward-Venne, Tyler; Breen, Leigh; Baker, Steven; Phillips, Stuart (2014). "Influence of aerobic exercise intensity on myofibrillar and mitochondrial protein synthesis in young men during early and late postexercise recovery". American Journal of Physiology. Endocrinology and Metabolism. 306 (9): E1025–E1032. doi:10.1152/ajpendo.00487.2013. PMC 4010655. PMID 24595306. Retrieved 14 June 2015.*
4. *Heyward, Vivian H. (2006) [1984]. "Designing Cardiorespiratory Exercise Programs". Advanced Fitness Assessment and Exercise Prescription (5th ed.). Champaign, Illinois: Human Kinetics. p. 104. ISBN 978-0-7360-5732-5. Retrieved May 7, 2012.*
5. VO_2 max: what do we know, and what do we still need to know. Levine, B.D. Institute for Exercise and Environmental Medicine, Presbyterian Hospital of Dallas, TX 75231. The Journal of Physiology, 2008 Jan 1;586(1):25-34. Epub 2007 Nov 15.
6. *Dlugosz E. M., Chappell M. A., Meek T. H., Szafrńska P., Zub K., Konarzewski M., Jones J. H., Bicudo J. E. P. W., Careau V., Garland T., Jr (2013). "Phylogenetic analysis of mammalian maximal oxygen consumption during exercise" (PDF). Journal of Experimental Biology. 216 (24): 4712–4721*
7. American council of exercises.
8. FIT INDIA, ministry of youth affairs and sports , Govt of india.