Add-on effects of different yoga mat materials on the subtle energy outcomes of yoga practices

Dissertation submitted by

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CERTIFICATE

This is to certify that Srihari Maiti who registered for the degree of Master of Science in Yoga Therapy at Swami Vivekananda Yoga Anusandhana Samsthana (S-VYASA University) Bengaluru, under the division of Yoga and Life Sciences, has completed the required training in acquiring the relevant knowledge of Yoga Therapy and has successfully carried out the research project titled "**Add-on effects of different yoga mat materials on the subtle energy outcomes of yoga practices**" in partial fulfilment of the course as per the regulation of the University.

Date:

Place: Bengaluru

Dr.B. Ragavendrasamy

DECLARATION

I, Srihari Maiti, hereby declare that this study was conducted by me at Swami Vivekananda Yoga Anusandhana Samsthaana, Bangalore, under the guidance of Dr.B. Raghavendrasamy of S-VYASA University, Bengaluru.

I also declare that the subject matter of my dissertation titled "**Add-on effects of different yoga mat materials on the subtle energy outcomes of yoga practices"** has not previously formed the basis of the award of any degree, diploma, associateship, fellowship or similar titles.

Date: **Srihari Maiti**

Place: Bengaluru

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Date: **Srihari Maiti**

Place: Bengaluru

STANDARD INTERNATIONAL TRANSLITERATION CODE USED TO TRANSLITERATE SANSKRIT WORDS

a	=	अ	ṅa	=	ङ	pa	=	प
ā	=	आ	ca	=	च	pha	=	फ
i	=	इ	cha	=	छ	ba	=	ब
ī	=	ई	ja	=	ज	bha	=	भ
u	=	उ	jha	=	झ	ma	=	म
ū	=	ऊ	ñ	=	ञ	ya	=	य
ṛ	=	ऋ	ṭa	=	ट	ra	=	र
ṝ	=	ॠ	ṭha	=	ठ	la	=	ल
e	=	ए	ḍa	=	ड	va	=	व
ai	=	ऐ	ḍha	=	ढ	śa	=	श
o	=	ओ	ṇa	=	ण	ṣa	=	ष
au	=	औ	ta	=	त	sa	=	स
ṁ	=	अं	tha	=	थ	ha	=	ह
ḥ	=	अः	da	=	द	kṣa	=	क्ष
ka	=	क	dha	=	ध	tra	=	त्र
kha	=	ख	na	=	न	jña	=	ज्ञ
ga	=	ग	gha	=	घ			

ABSTRACT

Background

In order to practice yoga sadhana, a yoga mat is often recommended to provide some level the characteristics such as grip, balance and comfort (the mat must allow the user to practice without feeling the ground). And often biomechanical investigations are conducted to assess grip, balance and comfort. However, yoga mats have never researched upon from the perspective of its add-on effects.

Aim

The aim is to study the influence of various yoga mats made of Cotton, Rubber and Kuma grass on the outcomes of yoga practice.

Materials and Methods

Twenty-three self-declared healthy male volunteers, with six or more months of practice to undergo two experimental states i.e., nadi-shudhi pranayama and breath awareness on three different yoga mat types: Rubber, Kuça and cotton on consecutive six days. In this study GDV express(EPI) instrument were used to analyze parameters integral area (IA) (general health), and integral entropy (disorderliness in energy).

Results and Discussion

Repeated measures Analysis of variance was performed to assess changes between the two time points and across the six different experimental conditions as described earlier. The variables of interest were Integral Entropy, Integral Area on right and left side without filter. The results indicate that, there were not much different in EPI parameters across the six condition. Interestingly, we have noted that there were no statistical significant changes in any of the experimental conditions following the intervention or the mat type.

Conclusion

Though the result are not statistically significant, energy parameters appears to be more stable and consistent throughout in Kuça mat condition compared to Cotton and Rubber.

Keywords

yoga mat, cotton, kuça, pranayama, alternate nostril breathing, nadi-shuddhi pranayama, GDV, EPI, eco-friendly.

Contents

1.1 INTRODUCTION

A journey into yoga means dissolving the identity of the self and learning to experience expansive-awareness rather than being caught up in a restrictive and skin-limited understanding of the self. However, yoga is currently observed by many who want to have a better posture and improved physical and mental health. Yoga practices are understood to be therapeutic and are being integrated as a part of medical management of ailments as well.

To start the practice is quite simple and we do this from the confines of our personalized, brightly colored, private rectangular yoga spaces called yoga mats. Are we assuming that we need a mat to practice yoga or is it possible to practice yoga without a mat.

1.2 Role of yoga mat in yoga practice – a common perspective

Traditionally, it is recommended that yoga practices be performed on a mat. Brief descriptions are available in the yoga literature regarding the use of different mats including those made of deer, tiger skin and silk materials. However, due to the regulation by law of the nation and more specifically the reason for practice being health and wellness, most people adopt practice using yoga mats made by Kuça grass or rubber.

Yoga being a non-invasive mass health care strategy does not require any external requirement apart from the mat on which an individual practices yoga. Having a huge economic implication, industries have insightfully developed yoga mats only with a perspective to offer better grip, comfort and safety to the practitioner by offering firm fixture to the ground, anti-slip nature and cushioning the body. Traditionally, it is recommended that the yoga mat be kept personal to the practitioner as it will also have a pattern of energy currents specific to the practitioner. However, no technology is presently available to discard this claim.

Traditional guidance for the yoga practices recommend using various types of mats for different purposes. And there is a wide variety of yoga mats that are available. Yoga mats are produced using diverse materials like elastic based, synthetic based, Cotton floor covering based and so forth. However, in the present scenario, yoga mats made of rubber, cotton and Kuça grass are being widely used by yoga practitioners round the globe. (B.G -6.11)

1.3 Requisite for yoga practice

Dress

A loose & comfortable outfit is suitable to wear in order to properly perform yoga, particularly asana (yoga poses). It is recommended to wear basic, comfortable, breathable something with a loose fit, giving freedom of movement. If clothes are poorly chosen, they can restrict the ability to move freely. One must avoid clothes that are too tight that interfere with both breathing and circulation because it is important to allow as much light and air as possible to have access to the body, and to offer as few obstacles as possible to the transpiration of the skin.

Timing

The very best time to practice yoga is upon waking up early in the morning after emptying the bowels and the second most conducive time is early evening around sunset before eating. Early morning means an hour and a half before sunrise and it is called Brahmamuhurta, 'the period of Brahma.' Evening, around the time of sunset, is called Sandhya. Sandhya is the meeting of day and night. These specified times for practice are important because of correlation to body rhythms and solar/lunar activities. The external influences of the sun rising or the evening commencing affect body rhythms and functions, making it conducive for yoga practice. And most importantly, it is recommended that practice of yoga be done every day at the same time. (H.Y.P- 2.11)

Environment

Yoga traditionally was practiced in retreat in nature, in the mountains and forests or by the river banks and sea shores. However, in the context of modern times, one may do yoga practice anywhere, but there are certain places that are better and certain places that one should avoid if possible. The place of practice must be very clean with availability of fresh air. It is recommended to choose the quietest place possible. In order to reap maximum benefits, an atmosphere to practice yoga would be an environment that is comfortable and convenient to your enjoyment. (B.G -6.11)

Food/Diet

There is a general misunderstanding that a more quantity of food is necessary for health and strength. However, care must be taken from becoming too food conscious because many people indulge in food as a means of escape for the mind. It is important to eat what is necessary to maintain bodily requirements and a diet which will be most conducive for yoga practice.

Moderation in diet in recommended, moderation in diet means neither overeating nor under eating. It means eating sparingly but comfortably filling the stomach and meeting the requirements of the body. Thus, body and mind remain healthy and balanced. The stomach should never be overloaded, it should be half filled with food, one quarter with water and one quarter with air. (B.G- 6.17)

1.4 Types of Yoga mat in Yogic tradition

It's prescribed in Ayurveda not to sit on bare floors because of the risk of *Vata*. Hence, the reason yogis recommended use of some kind of separation between themselves and the floor/rock etc. Traditional guidance for the yoga practices recommend using various types of mats for different purposes. However, in the present scenario, yoga mats made of rubber, cotton and Kuça grass are being widely used by yoga practitioners round the globe.

Rubber mats appear to be one of the commonest choice for yoga practices as they offer cushioning, and are slip-resistant. While cotton yoga mats are another alternative which gives good cushioning for yoga exercise because of soft texture & they absorb sweat easily. They are also easy to maintain since they can be regularly washed after use. It is that particular quality, that makes them more hygienic. But they are not long lasting as rubber yoga mats.

1.4.1 Mats – recommended materials and their relevance

1.4.1.1 Kuça

Kuça grass is scientifically known as panic grass and of genus borage species. Kuça grass mat is mainly used for sitting and doing meditation, yoga, puja like “Yana (“home”)”, praying god in home, etc.,
In Ayurveda, Kuça grass is also used as a medicine to treat dysentery and menorrhagia and to promote free flow of urine. Mats made of Kuça grass make very good meditation seats and sages often sit on Kuça grass mats when they do their meditation.

Kuça grass has been mentioned in the Rig Veda for use in sacred ceremonies and also to prepare a seat for priests. Kuça grass is specifically suggested by Lord Krishna in the Bhagavad-Gita as part of the ideal seat for meditation. According to early Buddhist accounts, Kuça grass was used by Buddha for his meditation seat when he attained enlightenment (Paul Williams, 2006).

And it is believed that Kuça grass blocks energy generated during meditation from being discharged through our body (mostly through legs and toes) into ground. Kuça grass can also be used to help shield people from the negative and scientific radiations. (A.V.S- 11.6.15; A.V.S. 6.43.1; R.S- 165)

1.4.1.2 Tiger Skin

Animal skins, whether sheep, yak or carnivorous beast, have been used for survival from the elements, comfort, convenience and status since humans could hunt or domesticate animals because of their easy availability, they were a readily available source of material to create clothing, dwellings and furnishings. Skins and furs form a natural mat or rudimentary carpet, and have been used in this way from prehistory up to our present technological age. Thus the usage of skins as a meditation seat also goes back to earliest times.

Often yogis chose tiger skin and it is evident from the pictures of yogis sitting on animal skin. Basically, they used what was available. For forest yogis it was natural to use a dry, tanned skin, like the non-conducting gloves when handling electricity.

It is believed that if you sit on a tiger skin, it was possible to acquire all the siddhis and supernatural powers. And that it brings power because the skin has its own vibration, provided the animal has died naturally, then the skin is believed to retain the natural quality or the nature of the animal. (B.G- 6.11; H.Y.P-1.57)

1.4.1.3 Silk

Silk is an animal fiber produced by certain insects to build their cocoons and webs, and is the only natural fiber that occurs in filament form. Silk is one amongst the oldest fibers known to man. Silk has been used and regarded as a highly valued textile fiber for over 4000 years. Silk has outstanding mechanical properties and biocompatibility. They displaying unusual mechanical properties, such as being strong, extensible, and mechanically compressible (Matsumoto et al., 2006).

Silk is one of the most beautiful fabrics available, with a long and colorful history and changing applications in the world today. Silk's capacity to absorb water makes it comfortable to wear in warm weather and whilst engaged in activity. However, it is equally good in cold weather, as its low conductivity keeps warm air close to the skin.

1.4.1.4 Deer skin

In olden days, the deer was always a part of the ancient Ashrams of sannyasins and maharishis and sages used to live in forests and there used to be many deer. When the deer died its natural death, their skin was used to made seats. Moreover, since Yogis and Sanyasis are usually away from civilization and man-made fabric material, it leads to the use of more natural and available 'fabric' of animal skin. They should have found the skin of the deer an easily procurable material for their yoga practice (Asana).

It is traditional for many kundalini Yoga practitioners to use sheepskins on which they do their yoga. Many yogis have recommended the sheepskin for meditation, as it creates an insulation between the yogi and the magnetic pull of the Earth. It is believed that they conserve the energy generated by meditation.

The sages found that doing Asana seated on a deer-skin was highly conducive to Siddhi from spiritual point of view. The power generated within the body through Asana was preserved by the skin. It is believed that sitting on a deerskin and meditating will help acquire all the aesthetic beauties, the charms of life, and liberation too. Using a deerskin also gave the soft or gentle nature of the deer. (B.G - 6.11)

1.4.1.5 Tabular representation

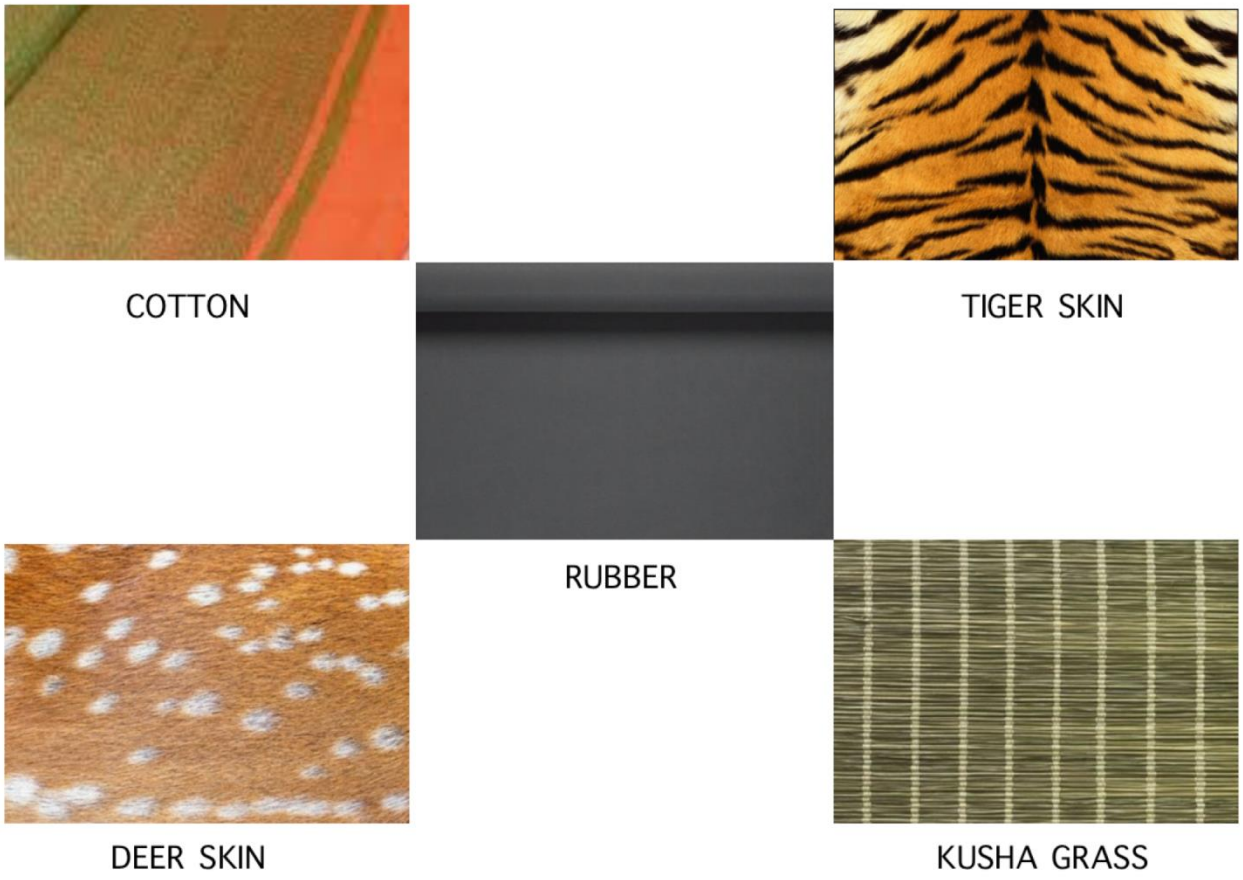

Fig. 1 Yoga mats made of different raw materials

1.5 Physiology of Yoga practice

Yoga is an ancient technique intended to stabilize and recondition the psycho-physiological make-up in an individual. Any mode of exercise or physical activity leads to a state of physical stress on the different systems that changes the homeostasis.

Yoga offers a unique combination of mild to moderate physical exercise (suryanamaskar and asana), cleansing process (Kaiya), breathing control (pranayama) and meditation (dhyana). And It has not only been used by healthy individuals for health maintenance and disease prevention but used as a treatment for a range of health conditions.

1.5.1 Yoga on Electro Photonic Imaging (EPI)

In the modern day scenario, a globally concern point is health and its care. Meditation is one of the way to enhance physiological and psychophysiological status of a meditator at a subtle level, which can be measure through Electro Photonic Imaging parameters*(K. Kushwah, Srinivasan, Nagendra, & Ilavarasu, 2015);(Guru Deo, Kumar, Srinivasan, & Kushwah, 2016)*. The EPI instrument specially design to measure the subtle energy level and to obtain health index level (G Deo et al., 2015), also emotional condition of an individual through different GDV parameters *(Korotkov, Matravers, Orlov, & Williams, 2010)*. Study has sawn that GDV parameters can be sued to identify bioenergetics change of the participant by given any intervention*(Haun, Patel, Schwartz, & Ritenbaugh, 2015)*.This technique become worldwide utilize for health assessment also in the filled of alternative medicine, therefore study has done to establish the normative data of EPI for the healthy Indian population, for the accuracy of EPI measurements and interpretations *(Kuldeep K. Kushwah, Srinivasan, Nagendra, & Ilavarasu, 2016a).*

1.5.2 Yoga on Metabolic functions/Metabolism

The practice of yoga generally leads to a more efficient functioning of the psycho-neuro-endocrine and immune system. Before the development of Western Medical science, yoga was believed to alter the neuroendocrine system which was vital to health.

A set of practices were developed in order to maintain healthy glands and the body's metabolism. There are strong evidences that suggests yoga has a positive impact on hormone regulation. Findings of such studies show there's improved glucose tolerance and insulin sensitivity after regular asana practice among type 2 diabetics. And clinical significant among the sample were noted in fasting plasma glucose and postprandial plasma glucose after yoga practice*(Jyotsna, 2014).*

1.5.3 Yoga on stress

A number of research studies exist on the effectiveness of yoga in stress management. Yoga practices are recognized for its effectiveness in helping people reduce psychological stress. Various aspects of the yoga intervention, such as physical exercise (suryanamaskar and asana), breathing control (pranayama) and meditation (dhyana) accounts for the observed beneficial effects on stress, mood and wellbeing. And another study shows that yoga intervention decreased the perceived stress significantly among the participants. It further discovered potential mechanisms of the observed yoga induced stress reduction by measure the salivary cortisol concentrations before and after a yoga class among the study sample.

Analysis showed that there was a decrease of mean cortisol levels, hormone responsible for sympathetic activation. Stress, in general may lead to anxiety and depression, involving chronic sympathetic activation and activation of HPA axis. As demonstrated in our second study sample, yoga practice induces an instantaneous decrease in salivary cortisol concentrations thus pointing to a direct effect on HPA axis.

Furthermore, it’s been found in previous studies that there are improved indices of cardiac autonomic function after comprehensive yoga practice. Yoga may also help in the relaxation response, for which a decrease in cortisol levels and sympathetic nervous system responsivity has been demonstrated*(Chatterjee & Mondal, 2017)*.

1.6 Role of earthing the human body

Throughout history, humans were walked barefoot or with footwear made of animal skins. They slept on the ground or on skins. Earthing (also known as grounding) refers to contact with the Earth's surface electrons by walking barefoot outside or sitting, working, or sleeping indoors connected to conductive systems, that transfer the energy from the ground into the body.

1.6.1 Principle underlying earthing the human body

Evidence shows that the Earth's negative potential may create a stable internal bioelectrical environment for the normal functioning of all body systems. Based on the scientific studies it has been well established that electrons from antioxidant molecules neutralize reactive oxygen species

(ROS, or in popular terms, free radicals) involved in the body's immune and inflammatory responses.

Studies suggest the concept that the Earth's electrons influence multiple physiological changes which are of clinical significance, with respect to pain, sleep, and a shift from sympathetic to parasympathetic tone in the autonomic nervous system (ANS), and a blood-thinning effect*(Sokal, Sokal, Chevalier, Sinatra, & Oschman, 2012)* .

1.6.2 Earthing & stress, sleep & pain.

Grounding the body at night through sleep also seems to have an effect morning fatigue levels, daytime energy, and nighttime pain levels. Results indicate that grounding the human body to earth ("earthing") during sleep reduces night-time levels of cortisol and re synchronizes cortisol hormone secretion more in alignment with the natural 24-hour circadian rhythm profile. Changes were most apparent in females. And subjects reported that enhancement in these conditions as well as improvements in sleep, pain, and stress— usually occurred rapidly within the first few days of ground-ing rather than gradually over.

You may also add stating that free electrons act as anti-inflammatory agents that reduce the extent of oxidative stress and inflammation. And, also there is a study mentioning that there is a potential difference between the ground and the human body in case of people who are using slippers / shoes for prolonged periods of time*(Ghaly & Teplitz, 2004)* .

2. LITERATURE REVIEW

2.1: Ancient literature review

2.1.1 Timing for pranayama

प्रातर्मध्यदिने सायमर्धरात्रे च कुंभकान्।

शनैरशीतिपर्यन्तं चतुर्वारं समभ्यसेत्॥११॥

prātarmadhyadine sāyamardharātre ca kumbhakān।
śanairaśītiparyantaṁ caturvāraṁ samabhyaset ||11|| (H.Y.P)

Retention should be practiced perfectly four times a day: early morning, midday, evening and midnight, so that retention is gradually held up to eighty (counts in one sitting).

2.1.2 Environment

Environment on Bhagavadgita

शुचौ देशे प्रतिष्ठाप्य स्थिरमासनमात्मनः।

नात्युच्छृतं नातिनीचं चेलाजिनकुशोत्तरम्॥६॥११॥

śucau deśe pratiṣṭhāpya sthiramāsanamātmanaḥ।
nātyucchṛitaṁ nātinīcaṁ celājinakuśottaram ||6.11|| (B.G -6.11)

Establishing a firm seat for himself in a clean place, not too high, not too low, Covered with a cloth, an antelope skin, and Kuça grass.

Environment on Hatha yoga praddipika

सुराज्ये धार्मिके देशे सुभिक्षे निरुपद्रवे।

धनुः प्रमाणपर्यन्तं शिलाग्निजलवर्जिते।

एकान्ते मठिकामध्ये स्थातव्यं हठयोगिना॥१२॥

surājye dhārmike deśe subhikṣe nirupadrave।
dhanuḥ pramāṇaparyantaṁ śilāgnijalavarjite।
ekānte maṭhikāmadhye sthātavyaṁ haṭhayoginā ||12|| (H.Y.P)

The hatha yogi should live alone in a hermitage and practice in a place the length of a bow (one and a half meters), where there is no exposure from hazard such as rock, fire or water, and must be well-administered and virtuous kingdom (nation or town) where good alms can be easily attained.

2.1.3 Food/Diet

Food and diet in Bhagavadgita

युक्ताहारविहारस्य युक्तचेष्टस्य कर्मसु ।

युक्तस्वप्नावबोधस्य योगो भवति दुःखहा ॥६ ।१७ ॥

yuktāhāravihārasya yuktaceṣṭasya karmasu ।
yuktasvapnāvabodhasya yogo bhavati duḥkhahā ।।6।17।। (B.G)

For him who is moderate in food and diversion, whose actions are disciplined, who is moderate in sleep and waking, Yoga destroys all sorrow 'Moderation in diet' means neither overeating nor under eating.

It means eating sparingly but comfortably filling the stomach and meeting the requirements of the body. Thus, body and mind remain healthy and balanced. A weak body cannot support a strong mind. A strong and healthy body reflects the nature of the mind.

Overeating and craving for food shows an uncontrolled mind. A yogi's diet should be sattvic, pure and not over spiced. Eat what is necessary to maintain your bodily requirements and choose a diet which will be most conducive for your sadhana. However, do not become too food conscious.

Food on Hatha yoga praddipika

ब्रह्मचारी मिताहारी त्यागी योगपरायणः ।

अब्दादूर्ध्वं भवेत्सिद्धो नात्र कार्या विचारणा ॥५७ ।

brahmacārī mitāhārī tyāgī yogaparāyaṇaḥ ।
abdādūrdhvaṁ bhavetsiddho nātra kāryā vicāraṇā ।।57। (H.Y.P)

One who is brahmachari, takes moderate and pure food, is regular and intent on yoga and renounces (attachment to sensual experience) becomes perfected (siddha) after a year.

So, one who keeps his mind above the existence of duality and sex, takes agreeable and sweet (mitahara) food, practices his sadhana regularly and maintains detachment from the affairs of mundane life, will definitely achieve perfection within a short period of time.

सुस्निग्धमधुराहारश्चतुर्थांशविवर्जितः ।

भुज्यते शिवसंप्रित्यै मितहारः स उच्यते ॥५८ ॥

susnigdhamadhurāhāraścaturthāṁśavivarjitaḥ ।
bhujyate śivasamprityai mitahāraḥ sa ucyate ।।58।। (H.Y.P)

Mitahara is defined as agreeable and sweet food, leaving one fourth of the stomach free, and eaten (as an offering to please Shiva).

2.1.4 kuça

Darbha or kuça grass is also known as desmostachya bipinnata which is its botanical name. The word 'kuça' is derived from the sanskrit word 'kuçala' meaning sharp, intelligent and wise, because of the sharp nature of the tip of the grass. It is considered the second most sacred herb in the vedäs after soma. The history of its use in vaidika times is estimated to be more than 3,500 years ago. The unique feature of kuça grass is that it has sharp edges and that of darbha that it is a hardy plant and, therefore, is a great survivor; its roots go deep in search of water. Buddha also used this meterial for his meditation seat when he attained enlightenment under Bodhi tree.

Various names and properties of kuśa in rasaśāstra

कुशो दर्भस्तथा बर्हिः सूच्यर्गो यज्ञभूषणः ।

ततोऽन्यो दीर्घपत्रः स्यात्क्षुरपत्रस्तथैव च ॥१६५ ॥

दर्भद्वयं त्रिदोषघ्नं मधुरं तुवरं हिमम् ।

मूत्रकृच्छाश्मरीतृष्णाबस्तिरुक्प्रदरास्रजित् ॥१६६ ॥

kuśo darbhastathā barhiḥ sūcyargo yajñabhūṣaṇaḥ ।
tatoa'nyo dīrghapatraḥ syātkṣurapatrastathaiva ca ।।165।।
darbhadvayaṁ tridoṣaghnaṁ madhuraṁ tuvaraṁ himam ।
mūtrakṛcchāśmarītṛṣṇābastirukpradarāsrajit ।।166।।

Kuça, darbha, barhi, sücyarga and yajïabhüñaëa all these are names of kuça and dérghapartra and kñurapatra are the names of Däbha. These two (Däbha & Kuça) are tridoña remover, sweet, astringent and cooling in nature. They help to cure problems of difficulty in urination, stones, thirst, bladder related diseases.

kuça in Atharva Veda çamhita

पञ्च राज्यानि विरुधां सोम श्रेष्ठानि ब्रूमः।

दर्भो भङ्ग्गो यवः ते नो मुञ्चन्त्व् अंहसः॥

pañca rājyāni virudhāṁ soma śreṣṭhāni brūmaḥ।
darbho bhaṅġou yavaḥ te no muñcantv aṁhasaḥ ।। A.V.S. 11.6.15 ।।

There are five sacred plants including darbha, bhäìga (cannabis), barley and saha and soma.Among whom, soma reigns supreme. These sacred herbs provide relief from all woes.

अयं दर्भो विमन्न्युकः स्वाय चारणाय च।

मन्योर्विमन्युकस्यायं मन्युशमन् उच्यते॥

ayaṁ darbho vimannyukaḥ svāya cāraṇāya ca।
manyorvimanyukasyāyaṁ manyuśaman ucyate ।। A.V.S.6.43.1 ।।

should sit on a firm seat, that which is neither too high nor too low, covered with sacredkuça grass, a deerskin, and a cloth, one over the other, in a clean spot.

2.1.5 Meditation

शुचौ देशे प्रथिष्टाप्य स्थिरमासनमात्मनः।

नात्युच्छ्रितं नातिनीचं चैलाजिनकुशोत्तरम्।६ ११।

śucau deśe prathiṣṭāpya sthiramāsanamātmanaḥ।

nātyucchritaṁ nātinīcaṁ cailājinakuśottaram।6 11।

समं कयशिरोग्रीवं धारक्यन्नचलं स्थिरः।

संप्रेक्ष्य नासिकाग्रं स्वं दिशश्चानवलोकयन्॥६-१३॥

samaṁ kayaśirogrīvaṁ dhārakyannacalaṁ sthiraḥ।
samprekṣya nāsikāgraṁ svaṁ diśaścānavalokayan||6.13||

Holding the body, head and neck erect, Motionless and steady, Gazing at the tip of his own nose And not looking in any direction.

2.1.6 Nadisuddhi Pranayama (ANB)

बद्धपद्मसना योगी प्राणं चंद्रेण पूरयेत्।

धारयित्वा यथाशक्ति भूयः सूर्येण् रेचयेत्॥७॥

baddhapadmasanā yogī prāṇaṁ candreṇa pūrayet।
dhārayitvā yathāśakti bhūyaḥ sūryeṇ recayet||7||(H.Y.P)

Sitting in baddha padmasana, the yogi should inhale through the left nostril and hold the breath to capacity, and then exhale through the right nostril. Then inhaling through the right nostril,gradually fill the abdomen, perform, kumbhaka as before, then exhale completely through the left nostril.

2.1.7 Padmasana (Lotus pose)

वामोरुपरि दक्षिणं च चरणं संस्थाप्य वामं तथा

दक्षोरुपरि पशिचमेन विधिना धृत्वा कराभ्यां दृढम्।

अंगुष्टौ ह्रदये निधाय चिबुकं नासाग्रमालोकयेत

एतद्वयाधिविनाशकारि यमिनां पद्मासनं प्रोच्यते॥४४।

vāmoarupari dakṣiaṇaṁ ca caraṇaṁ saṁsthāpya vāmaṁ tathā
dakṣoarupari paśicamena vidhinā dhṛtvā karābhyāṁ dṛḍham।
aṅguṣṭau hradaye nidhāya cibukaṁ nāsāgramālokayet
etadvayādhivināśakāri yamināṁ padmāsanaṁ procyate||44|(H.Y.P)

Place the right foot on the left thigh and the left foot on the right thigh, cross the hands behind the back and firmly hold the toes. Press the chin against the chest and look at the tip of the nose. This is called padmasana, the destroyer of a yogi's diseases.

2.1.7 Regulated breathing

अपाने जुह्वति प्राणं प्रणे ऽपानं तथापरे ।

प्रणापानगती रुद्ध्वा प्राणायामपरायणाः ॥४-३१ ॥

apāne juhvati prāṇaṁ praṇe ' paanaṁ tathāpare।
praṇāpānagatī ruddhvā prāṇāyāmaparāyaṇāḥ।।4-31।।

Some offer inhalation into exhalation, And others exhalation into inhalation, Restraining the path of inhalation and exhalation, Intent on control of the vital breath.

2.1.8 Sympathetic & Parasympathetic (Ida/Pingala)

During pranayama practice the mind should be steady and aware and not moving from thought to thought. Then the whole system is receptive. When the mind is inert or tamasic, some of the nadis remain inert and closed, impurities collect and the energy cannot pass. However, this does not mean that if you are tamasic you cannot practice pranayama. Whether you are tamasic or rajasic, pranayama should be practiced to remove the blockages and to lift you out of the tamasic and rajasic states. When the mind is sattwic, the inner awareness grows quickly and prana accumulates. When sushumna awakens, this represents sattwa, when pingala functions it represents rajas and when ida functions, tamas. Thus it is best to practice pranayama when sushumna is flowing. When the breath is flowing naturally through both nostrils, it means sushumna is active. We do not always breathe through both nostrils, usually one nostril is open and the other is partially or fully closed.

When the shakti moves through pingala the left brain hemisphere is activated and only certain faculties of the mind operate. When ida flows, the right brain hemisphere is active and other faculties operate. However, when the energy is passing through the corpus callosum, from one hemisphere to the other, then there is equilibrium. When a steady flow of energy or prana moves through sushumna, the mind becomes still.

When the particular frequency of the energy is such that it arouses perfect stillness of thought activities and no awareness of the external or internal world that is manonmani avastha. Manonmani means ‘absence of individual mind;’absence of fluctuations in the individual consciousness, and absence of conscious, subconscious and unconscious states. By cutting off the external stimuli to the brain over a long period of time, the conscious functions of the brain ‘turn off’

and shoonya or ‘void’ is experienced. This state of shoonya or nothingness often leads to the more positive experience of manonmani.

To balance the breath and ida/pingala, or the sympathetic/parasympathetic nervous systems a beginner must fellow nadisuddhi practice. Of course, this pranayama should only be done on an empty stomach, and it should only be done on the instructions of the guru. If your pingala nadi naturally predominates during the day, it is not advisable to practice this pranayama. When pingala flows, the mind and senses are extroverted, the left brain hemisphere functions, the sympathetic nervous system is active and the body is heated. Pingala should not be made to function excessively, it should be in harmony with the functioning of ida. Unlike nadi shodhana pranayama which balances the breath and brain hemispheres, suryabheda predominantly.

2.2. Scientific literature review

2.2.1 Alternate nostril breathing

Alternate nostril breathing causes differential physiological and psychological effects. An investigation on autonomic effects of alternate nostril breathing & paced breathing at the same respiratory rate suggests that both breathing practices increases the autonomic modulation without much changes in sympatho-vagal balance and autonomic changes are largely mediated by breathing rate in individuals (*Lee & Ghiya, 2012*). And another study suggests that vagal activity increased during & after the practice of alternate nostril breathing. And it could contribute to decrease in blood pressure and changes in heart rate variability(*Balkrishna, 2014*).

2.2.2 Meditation among meditators and non-meditators

Mental and emotional states play a role in mental capacity of an individual to concentrate on ongoing tasks (*Ehring et al., 2011*). Two groups of similar socio-economic characteristics were examined and their results suggest that mindfulness meditators have greater respiratory interoceptive accuracy compared to non-meditators *(Daubenmier, Sze, Kerr, Kemeny, & Mehling, 2013).*

2.2.3 New light on well being

Results of volunteers involved in three experimental conditions (orthostatic test, exercise tests, chocolate test) were assessed to find a correlation among the variables of HRV and GDV. Measures taken before & after following the three experimental conditions demonstrate that stress index and area of GDV parameters correlate strongly with HRV measure of sympatho-vagal balance. A Low Frequency which corresponds to sympathetic component correlates with stress index parameter of GDV (*Gh, Giacomoni, & Rein, 2004*).

2.3 Summary of Scientific Literature Review

AUTHORS	SAMPLE SIZE	INTERVENTION	RESULTS & CONCLUSION

2.3.1 Electro Photonic Imaging (EPI)

(K. Kushwah et al., 2015)	N=1297, among them 880 was Healthy participants, (33.55 ± 10.92), which includes M=584 F=296.		The results clearly suggest difference in Integral Area parameters in each conditions, with filter (physiological) also without filter (psycho-physiological) between the Indian and also the EU population. Study shows the range of Integral Area values and narrower range for values of other variables different in Indian populations compare to EU population. EPI studies age and gender is a factor one must consider.
(Kuldeep K. Kushwah et al., 2016a)	N=66 male, age ranges from thirty five to sixty years (53.97 ± 5.96) were included in the study.	Total 35 min of Cyclic Meditation (CM) and equal duration of Supine Rest (SR) session was given to the participant.	There is significant reduction of stress level, and significant improvement in health index in CM group compare to SR group. The investigations of this study shows that Cyclic Meditation practice decrees stress and improves psychosomatic health indices compare to Supine Rest.
(Kuldeep Kumar Kushwah, Nagendra, & Srinivasan, 2016)	N=94 healthy volunteers (M=55 and F=39), age (26.70 ±8.58) were included in the study.	Four weeks of Integrated Yoga Program	The results also revealed a highly significant reduction in stress levels and highly significant improvement in the health indices at the psycho-physiological level. Therefore, IYP helps in prevention of ill health and also preserves health.

(Guru Deo & Srinivasan, 2018)	51 subjects which included 32 males and 19 females of age 18 years and above (mean age 45.64 ± 14.43).	Five days of intensive anapanasati meditation technique was given to all participants.	There are significant changes in EPI parameter integral area with filter (physiological) in both right and left side, which reflects the availability of high functional energy reserve in meditators. The study suggests that EPI can be used in the recording functional physiological and psychophysiological status of meditators at a subtle level.
(Korotkov et al., 2010)	The review has done based on 136 articles from different publication date from 2003 to 2007.		1) The GDV express device is a convenient device, which easily allows examining patients with various pathologies. And it offers a wide range of applications. (2) The GDV express is very fast (i.e., it is an "express-method" for studying states of the human organism). (3) Review has revealed that GDV method can be implemented as an express method for assessment of treatment, its effectiveness, evaluating emotional and physical conditions of people.
(Cioca, Giacomoni, & Rein, 2004)		the orthostatic test consisting of deep breathing followed by rapid standing; ten minutes of strenuous exercise and consumption of chocolate.	Statistical significance was observed between certain GDV parameters and spectral analysis of HRV for all three conditions. Such an analysis of HRV supplies information on the balance between the sympathetic and parasympathetic nervous system as they regulate heart rate. Previous investigations have shown that the parasympathetic system dominates

			during exercise, whereas the sympathetic system predominates during the orthotest. In either situation the sympathetic component of HRV was correlated with the GDV. Similar correlations were observed when there was balance between the sympathetic and parasympathetic systems. These correlations indicate that GDV measures can be used as a measure of well-being in physiological and psycho-physiological conditions.

2.3.2 Alternate nostril breathing

(Lee & Ghiya, 2012)	Twenty healthy individuals (22.3 ± 2.9 years) 8 males, 12 females Age Range: 19 - 29 years (non-practitioner)	Participants performed Anulom-Vilom &Paced Breathing in a random order for 30 min, preceded & followed by 5 min of seated rest.	An increase in TP, LF, and HF following ANB & PB suggest that both conditions increased cardiac autonomic modulation. Data suggests that both ANB & PB increase autonomic modulation without causing a significant shift in Sympathovagal balance.
(Balkrishna, 2014)	Total sample was 26 male volunteers (group mean age ±SD, 23.8±3.5 years).	15 minutes of alternate nostril yoga breathing (ANYB) and breath awareness (BAW).	The results suggest that vagal activity increased during and after ANYB, which could have contributed to the decrease in BP and changes in the HRV.
(Kamath, Urval, & Shenoy, 2017)	N=30 (medical students) Yoga=15 Control=15.	For control group simulated public speaking test (SPST). Yoga group performed alternate nostril breathing for 15 minutes.	However, the experiment group showed a trend towards lower mean scores for the anxiety factor in compared with the control group. Alternate nostril breathing might have potential

			anxiolytic impact in acute stressful condition.
(Garg, Malhotra, Tripathi, & Agarawal, 2016)	51 female subjects (age 18-25 years, mean±SD =21.71±3.11) were taken and divided into three groups (n=17).	three types breathing ware given to each group Right Nostril Breathing (RNB), Left Nostril Breathing (LNB) and Alternate Nostril Breathing (ANB) for 1 week for 45 minutes daily.	Inclusion of three types nostril breathing exercise regimen could be helpful in improving recall of memory.

2.3.3 Meditation

(Daubenmier et al., 2013)	Vipassana meditation practitioners, Nonmeditators	Mind-Body Awareness/ Mindfulness based meditation among meditators and non-meditators.	Mindfulness meditators have greater respiratory interoceptive accuracy compared to nonmeditators, at least under specific task conditions.
(*G Deo, Itagi, Thaiyar, & Kuldeep, 2015)*	51 subjects comprising 32 males and 19 females of age 18 years and above (mean age 45.64 +/- 14.43)	5 days of intensive meditation anapanasati meditation technique ware given.	The study shows significant changes in EPI parameter integral area (physiological and psycho-physiological)) in both right and left side, which reflects the availability of high functional energy reserve in meditators.

2.3.4 Kuça Grass

(Deena .S.R et.al, 2015)	Six tropical grasses, namely Darbha, Lemongrass, Bermuda grass, Mauritian Grass, Bamboo and, Windmill grass. SASTRA University campus, Thanjavur, Tamil Nadu, India.	Fermentable food items like curd during lunar and solar eclipse, Experiments on the interaction of the grass with cow's curd indicate that the Desmotachya bipinnata.	The morphology and disinfecting ability of Darbha is compared with five other tropical grasses.

2.3.3 Padmasana

(Ghosh, Kuntal Hankey, Alex Srinivasan, TM Year:2017)	52 male Yoga practitioners (mean age in years 23.03 ± 3.23), all with >1 year experience of Yoga practices.	Participants were alternately divided into two different groups, sitting in Lotus Posture and sitting in a chair. Each was measured on 3 successive days.	Sitting in Lotus Posture is seen to be, strongly stimulate subtle E_Ls, so results was significant as per the experimental hypothesis. Nevertheless, decreases in E_Ls of those sitting in a chair were surprising since the rest might be expected to have no effect.

3. AIMS & OBJECTIVES

3.1 Aim

- The aim is to study the influence of various yoga mats made of Cotton, Rubber and Kuma grass on the outcomes of yoga practice.

3.2 Objectives

- To showcase the impact of various yoga mats used for yoga practice / meditation
- The objective of this study is to measure the changes in various parameter of EPI., before, and after fifteen minutes' intervention of guided breath awareness, guided alternate nostril breathing & self-regulated breathing practice of equal duration on various yoga mats (Rubber, Kuça Grass, Cotton).
- To validate the effect of traditional mat (Kuça) used for meditation with scientific evidences.

3.3 Research Question

- Whether mats used for meditation be backed with scientific evidence for its influences?
- Whether the impact of traditionally used Kuça grass mat be showcased?
- Will it create awareness among people to use traditional resources to modern scenarios?

3.4 Research Hypothesis

1. Rubber yoga mat used for practicing yoga might influence the outcomes following yoga practice.
2. Cotton yoga mat used for practicing yoga might influence the outcomes following yoga practice.
3. Kuça yoga mat used for practicing yoga might influence the outcomes following yoga practice.

3.5 Null Hypothesis

1. Rubber yoga mat used for practicing yoga might not influence the outcomes following yoga practice.
2. Cotton yoga mat used for practicing yoga might not influence the outcomes following yoga practice.
3. Kuça yoga mat used for practicing yoga might not influence the outcomes following yoga practice.

4. METHODS

4.1 Source of Subject

Twenty-three self-declared healthy male volunteers, with six or more months of practice, ages ranging from 18 to 33 years (group mean age – SD, 23.1 ± 3.5 years) residing at S-VYASA University, Bangalore and Maharshi Dayanand Saraswati University of Ajmer were recruited as subjects for the study following obtaining written informed consent. All the subjects were not under any medication for any ailment or debility.

Male volunteers alone were selected as autonomic and respiratory variables are known to vary with the phases of the menstrual cycle. All the subjects recruited had been practicing various forms of meditation in the past 6 months. Apart from their prior experience of meditation, they were given a 3-day orientation program.

All participants expressed their willingness to take part in the experiment. The study was approved by the institution's ethics committee. The design of the study was explained to the participant, and their signed consent was obtained.

4.2 Design

The research study involved the subjects to undergo two experimental states i.e., nadi-shudhi pranayama and breath awareness on three different yoga mat types: Rubber, Kuça and cotton on consecutive six days. The order of the intervention was randomized.

The participants were assigned randomly to different mats on different days for 6 days. Each session included three sequences. These were (i) Sequence 1: Guided regulated breathing with 5 second to inhale and 5 seconds to exhale for 5 minutes (ratio of inhalation: exhalation [1:1]). (ii) Sequence 2: Alternate Nostril Yoga Breathing (ANB) for 5 minutes in 1:2 ratio for inhalation and exhalation respectively (5 seconds to inhale and 10 seconds to exhale). (iii) Sequence 3: Self-regulated Breath Awareness for 5 minutes. Each of these 3 sessions on 6 days consisted 2 states: pre, and post to collect GDV reading.

Each session consisted of 25 min in total and during which subjects were made to practice on any one of the three yoga mats using recorded instructions. The instructions to perform practices were recorded to avoid any instructor or time bias. In that 25 min duration first 5min and last 5mis was idle sitting. This was for 6 days keeping the time of the day constant for each subject. Participants were assigned randomly to these 6 possible sequences using a random number table.

Hence, each participant was assessed on six different days at the same time of the day, with the assignment of participants to different mats being random.

Fig. 1 Schematic presentation of the Control and Experiment condition

Variable	Description
*YMS01_*	*YogaMatStudy (YMS), 01/02 corresponds to participant serial number, _followed by K (C/E), C (C/E), R (C/E)*
K(c)	*Kuça Control*
C(c)	*Cotton Control*
R(c)	*Rubber Control*
R(e)	*Rubber Experimental*
C(e)	*Cotton Experimental*
K(e)	*Kuça Experimental*

Fig. 2 Schematic presentation of the random table

Code	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6
YMS01_	K©	C©	R©	R(e)	C(e)	K(e)
YMS02_	K(e)	K©	C©	R©	R(e)	C(e)
YMS03_	K(e)	C(e)	K©	C©	R©	R(e)
YMS05_	K(e)	C(e)	R(e)	R©	K©	C©
YMS07_	K(e)	R(e)	R©	C©	K©	C(e)
YMS09_	R©	C©	K©	R(e)	C(e)	K(e)
YMS010_	C©	R©	K(e)	C(e)	R(e)	K©
YMS011_	K©	C©	R©	K(e)	C(e)	R(e)
YMS012_	K(e)	K©	C©	R©	R(e)	C(e)
YMS013_	C(e)	R(e)	K©	C©	R©	K(e)
YMS015_	K(e)	R(e)	C(e)	R©	K©	C©
YMS017_	C(e)	K(e)	R©	C©	K©	R(e)
YMS020_	C©	R©	R(e)	C(e)	K(e)	K©
YMS021_	K©	C©	R©	R(e)	K(e)	C(e)
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YMS023_	K(e)	R(e)	K©	C©	R©	C(e)
YMS024_	R(e)	K(e)	C(e)	K©	C©	R©
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YMS027_	R(e)	C(e)	R©	C©	K©	K(e)
YMS028_	K(e)	R©	C©	K©	C(e)	R(e)
*YMS029_*	R(e)	C(e)	K©	C©	R©	K(e)
YMS030_	C(e)	K©	C©	R©	K(e)	R(e)

4.3 Inclusion Criteria

Yoga Practitioner for 6 months or more, in normal health and not on any medication during the study were chosen as samples. (Inclusion criteria based on previous studies: *(Guru Deo et al., 2016).*

4.4 Exclusion Criteria

Individuals with any physical disability, mental instability, or inability to sit in Padmasana (Lotus Posture) for 15 minutes or more will be excluded from participating in the study. who Individuals had cuts in the fingers, missing fingers, any health-related issues and substance abuse(smoked or taken alcohol on the day of measurement) were excluded from the study*(Kuldeep K. Kushwah, Srinivasan, Nagendra, & Ilavarasu, 2016b).*

4.5 Assessment

4.5.1 Electro Photonic Imaging (EPI)

The Gas Discharge Visualization (GDV) technique which is also known as Electro Photonic Imaging (EPI) technique been used in several studies as a scientific device to evaluate stress, general health depends on a measure of stimulated optoelectronic emission of humans (Korotkov et al., 2010).This instruments also used for various purpose like detecting anxiety, depression etc. This emission takes place when the finger tips are exposed to the glass plate with a short electric pulse of high voltage (10 kv), with high frequency (1024 Hz) and low current in micro amps for less than a millisecond. To capture the images CCD-camera had placed under a dielectric plate in the EPI system(Kuldeep K. Kushwah et al., 2016b).

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4.5.1.1 Electro photonic imaging parameters(EPI)

Integral area left and right

The integral area left (IAL) side and the integral area right (IAR) side parameters are a measure of general health index of a subject being measured.

Integral entropy left and right

Integral entropy left (IEL) side and integral entropy right (ILR) side parameters are components that show the degree of disorderliness in the human energy field*(Kuldeep K. Kushwah et al., 2016a).*

4.6 Intervention

The subjects were asked to come to the laboratory for 6 consecutive days at the same time of the day so as to maintain similar diet and physical activity levels of all the subjects. Throughout all sessions participants sat in Padmasana and kept their eyes closed following prerecorded instructions. An emphasis was placed on carrying out the practices slowly, with awareness of physical and mental sensations and relaxation. Participants were given a 3-day meditation orientation program under our guidance. The purpose of this orientation was for all participants to practice based on specific instructions. The experiment was conducted in a sound attenuated, temperature-controlled environment.

Participants were randomly made to sit on a mat made of cotton, rubber or kuça and they were allowed to wander freely as they listened to a pre-recorded audio consisting of brief periods of instructions. The instruction was meant to induce a non-meditative relaxed state before the intervention.

Participants were then asked to follow the audio instructions for the practice of guided regulated breathing for 5 minutes which involves conscious effort to keep the breathing pattern restricted to 5 seconds to inhale and 5 seconds to exhale as per the instructions given in the audio.

Participants were then asked to follow the audio instruction for the practice of guided ANB in 1:2 ratio of inhalation & exhalation with 5 seconds to inhale and 10 seconds to exhale. They were supposed to be aware of and be absorbed with the breath. And finally, participants were asked to follow self-regulated breathing as per their ability to comply with the ratio of 1:1 breathing.

4.7. Data Collection

The data were extracted from the GDV Diagram.

4.7.1 Procedure

To get the data from the EPI instrument 10 fingers of both the hands were used. Two time (Per-Post) reading was done for data collection of each participant, without any filter. Throughout the study guidelines was followed to maintain an accuracy and reliable in data (Korotkov, K. (2002). Human Energy Field: study with GDV bioelectrography.) such as 3 hours of gap has been given for data collection after food intake, maintenance of room temperature, ambience, etc. Instructions was given to all the participant to remove any metal items from the body which were not worn 24 h a day. Specific guideline was instructed to the participant for the fingertip placement on the glass plate of GDV Express instrument. The calibration process was held for EPI instrument based on the requirement. To clean the dielectric plate, small cotton cloth and an alcoholic solution were used. To keep the consistency in data GDV-express devices were used throughout the study. These devices were made by Kirlionics Technologies International, Saint-Petersburg, Russia.

4.8 Ethical consideration

A written informed consent wasobtained from all the participants recruited for the study. The participants were free to withdraw from the study at any point of time. The assessments are non-invasive and no subjects in the study reported any difficulty or complaint following the assessments.

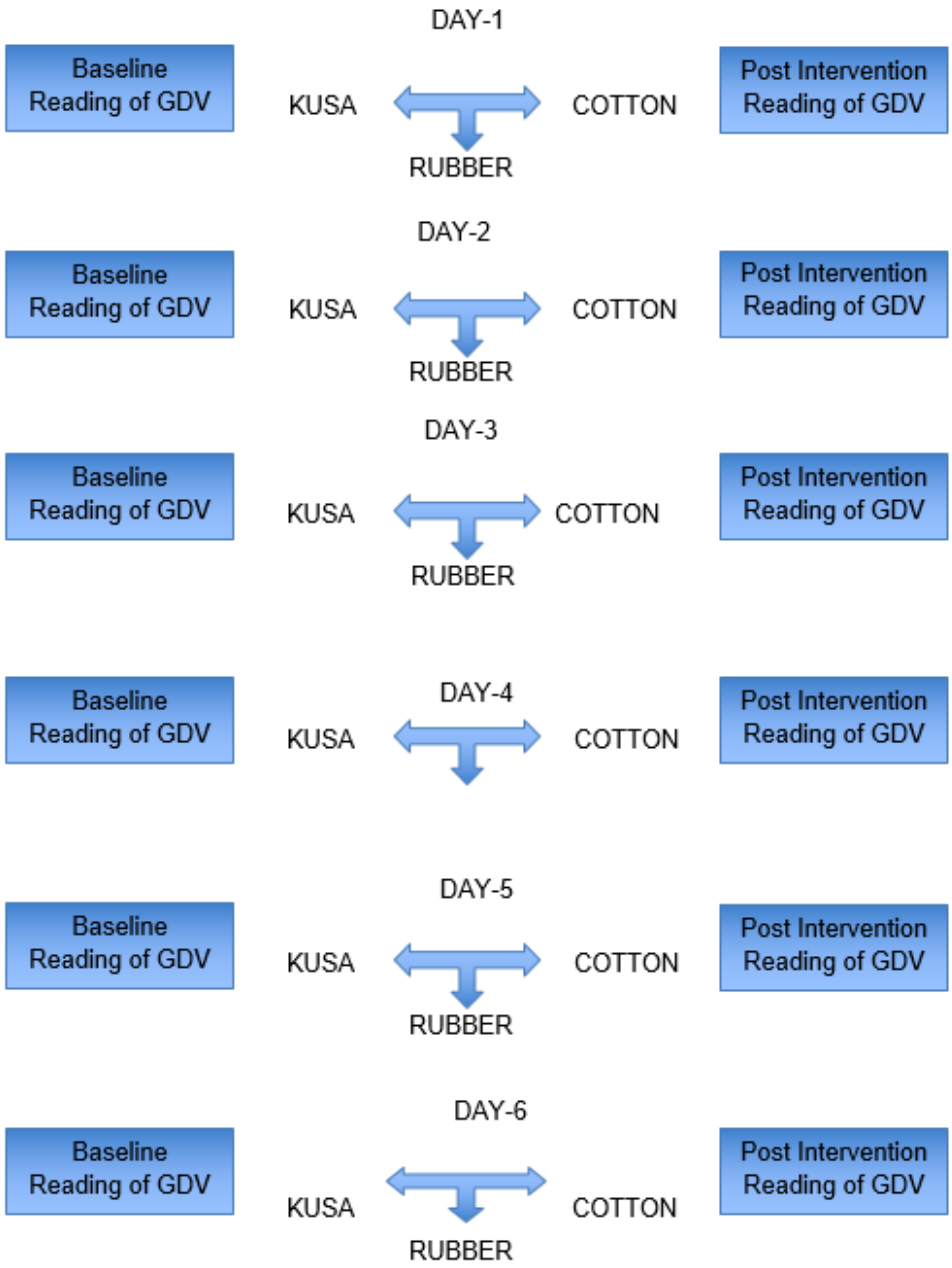
4.9. Data Analysis

All the data were extracted as per the standard procedure recommended for the respective tool. The data were manually inspected for completeness and any incomplete data were removed from data analysis. The data was checked for normality. And based on the distribution of the data, statistical analysis was done using SPSS to measure the changes in autonomic variables.

Repeated measures analysis of variance (RMANOVA) were performed with two ‘‘within subjects’’ factors (i.e., Factor 1: Sessions; Cotton, Rubber, Kuma and Factor 2: States; Pre, and Post).

This was followed by a post hoc analysis with Bonferroni adjustment for multiple comparisons between the mean values of different states (Pre, and Post) and all comparisons were made with the respective Pre state.

Selection of Yoga Practitioners, (n=23) from _VYASA & MDSU



5.RESULTS

Repeated measures Analysis of variance was performed to assess changes between the two time points and across the six different experimental conditions as described earlier. The variables of interest were Integral Entropy, Integral Area on right and left side without filter.

All the variables of interest met the condition of sphericity. Interestingly no significant changes were noted across any of the comparisons.

Table:1 shows mean, SD of Integral Area right and left (IA-R, L), and Integral Entropy right and left (IE-R, L) in control condition.

VARIABLE	CC		KC		RC	
	PRE	POST	PRE	POST	PRE	POST
IAL	0.08±0.58	0.17±0.38	0.17±0.46	0.17±0.43	0.16±0.36	0.32±0.36
IAR	0.04±0.64	0.15±0.52	0.1±0.42	0.1±0.38	0±0.57	0.24±0.37
IEL	1.88±0.19	1.87±0.22	1.89±0.2	1.89±0.23	1.86±0.2	1.86±0.26
IER	1.9±0.15	1.9±0.21	1.91±0.17	1.87±0.2	1.94±0.2	1.89±0.26

Table:2 shows mean, SD of Integral Area right and left, and Integral Entropy right and left in experiment condition.

VARIABLE	CE		KE		RE	
	PRE	POST	PRE	POST	PRE	POST
IAL	0.18±0.4	0.26±0.3	0.21±0.57	0.2±0.37	0.03±0.57	0.2±0.34
IAR	0.23±0.43	0.24±0.4	0.13±0.61	0.13±0.51	0.05±0.55	0.09±0.53
IEL	1.85±0.2	1.83±0.23	1.81±0.24	1.79±0.19	1.92±0.2	1.8±0.23
IER	1.84±0.27	1.87±0.18	1.91±0.19	1.91±0.17	1.9±0.23	1.91±0.17

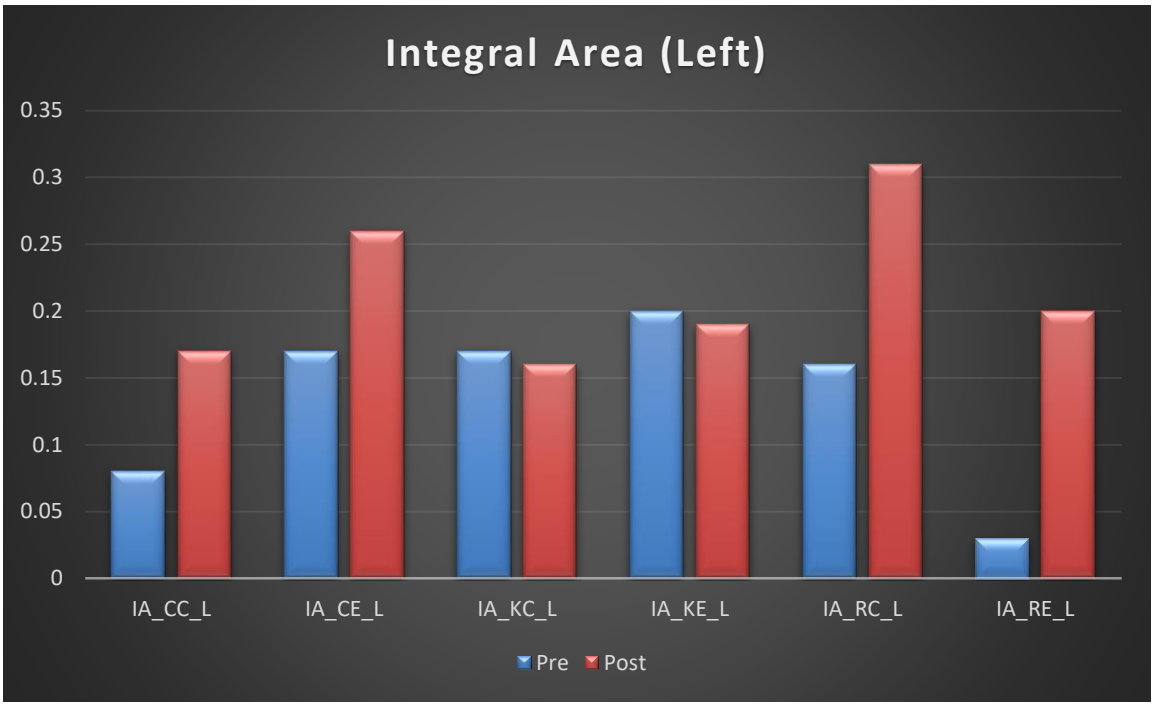


Figure 1: Integral Area Left across control and experimental conditions

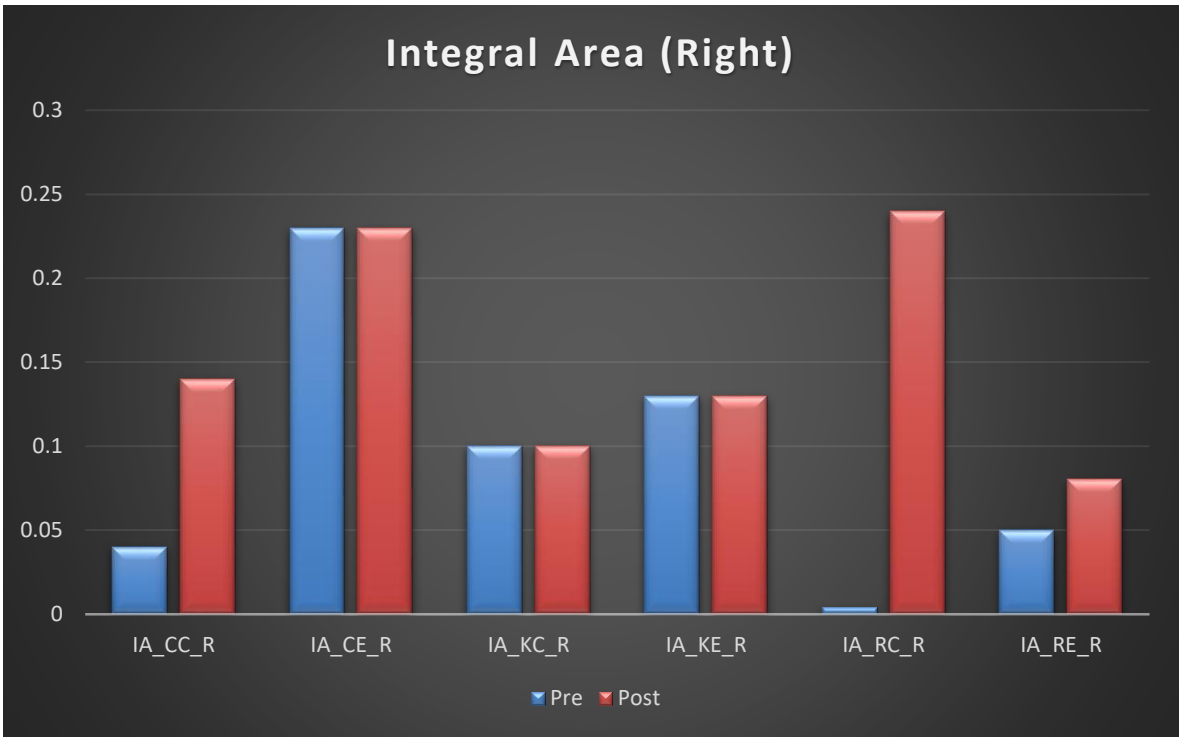


Figure 2: Integral Area Right across control and experimental conditions

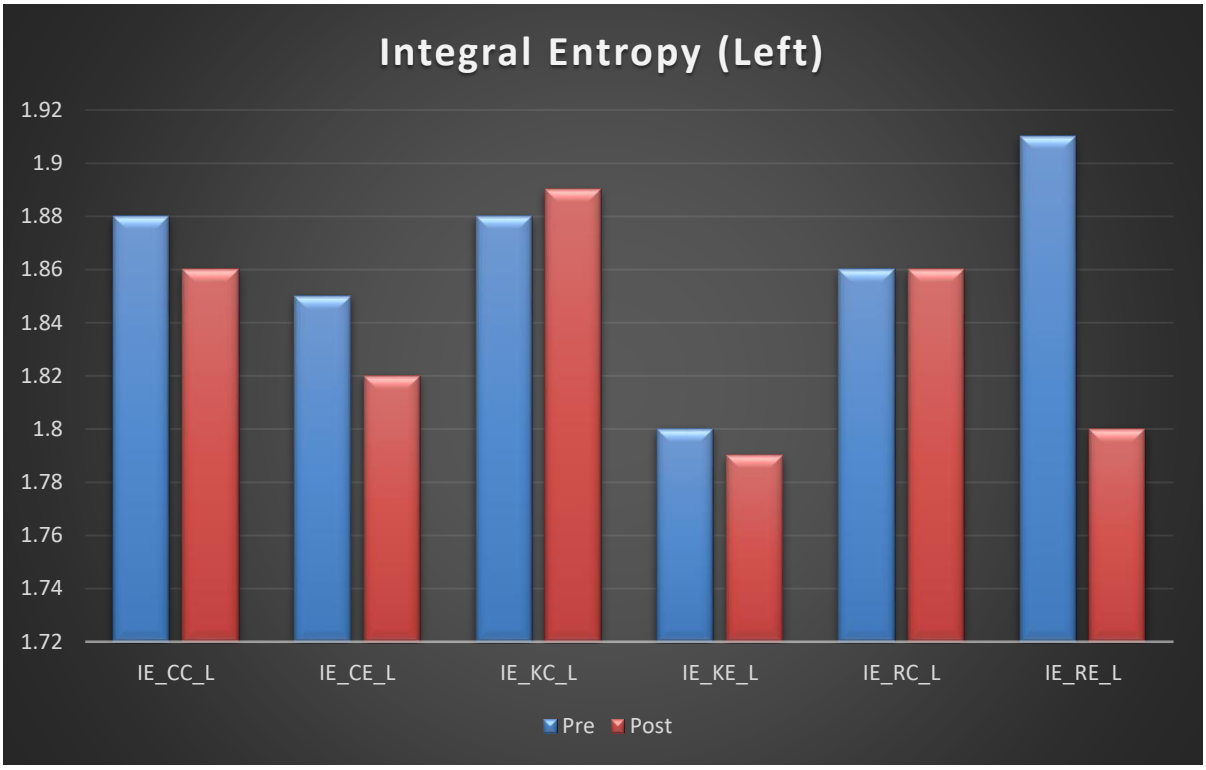


Figure 3: Integral Entropy Left across control and experimental conditions

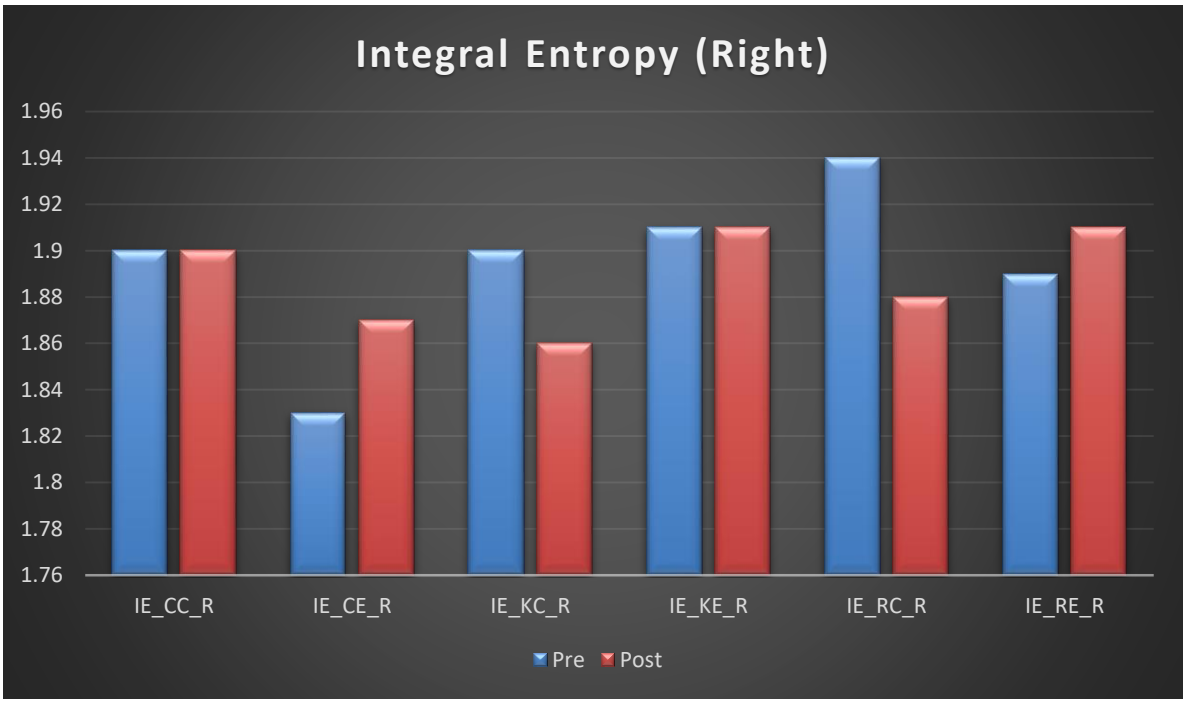


Figure 4: Integral Entropy Right across control and experimental conditions

6: DISCUSSION

Twenty-three healthy experienced Yoga practitioners were recruited to the study following obtaining written informed consent. The subjects were randomly on each day allocated to either the experimental or the control sessions on one of the three conditions: rubber mat, Kuça mat & cotton mat sessions to control for any laboratory bias. All the data were normally distributed. No significant differences in baseline values were noted across the six consecutive days of assessments for the subjects in the study.

Interestingly, we have noted that there were no significant changes in any of the experimental conditions following the intervention or the mat type. We speculate that this might be attributed to the already stabilized subtle energy levels in the experienced yoga practitioners, whose subtle energy patters does not vary significantly following nadishuddhi pranayama or breath awareness session.

Pervious study has shown long term yoga practitioner tent to positive changes, there is high chances in equilibrium of subtle energy level. Though studies suggested that the mean value of GDV parameters IA seen to be lower and IE is higher, still it is statistically not significant due to cumulative effect of long term practice*(Guru Deo et al., 2016).*

7: CONCLUSION

The present study result shows that the effect of different yoga mat material on a yoga practitioner in subtle energy level and psycho-physiology level has no significant changes.

It is found that, the different of Integral area and Integral entropy parameters level in different condition on different days is very less.

The previous studies show that among experienced yoga practitioners, subtle energy levels have been more stable compared to normal population. And the same was observed among yoga practitioners, on different condition on different mats. Hence the current investigation suggests that more experiment needs to be done in order to understand the impact of various material on a yoga practitioner.

8. APPRAISAL

8.1 Strengths of the Study:

- This study was one of a kind and very unique also. We had studied the immediate effect of the intervention of the mat materials on healthy individual.
- In this study the data was collected for each individual on six different days regularly, at the same time on different days.
- Prior recoded intervention was given to mention the stander of it.
- Sample randomization in order to control sample bias and other confounding factors in this study.
- Availability of appropriate equipment to measure the variable, that gave consistent data.
- Providing orientation program to the participant.

8.2 Limitations of the Study:

Participants were randomly assigned to six possible sequences, with the six sessions on separate days. Due to these randomly fixed-session sequences, there is an inherent confounding bias in the results so that changes which occur in a session preceding the intervention could possibly have carryover effects to the control and experimental session.

Other limitations of the study are related to the diet habit of the participants there was no attempt to control for this.

8.3 Suggestions for Further Research

- Recommendations for future studies yet to be undertaken, should consider the following points: For meditational studies, others parameters must be considered to get reliable outcome measures.
- To control confounding factors in the studies, temperature, humidity, and persons' diet intake must be taken care.
- Further study must be done to understand the impact of yoga mate in long term usage.
- Need to study the effects of yoga mats using various instruments.
- Need to include other widely used yoga mat materials to add including no mat condition.

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10. APPENDIX

10.1 Appendix 1- Raw Data

Table 1: Raw data of cotton control on Integral area and Integral entropy

Code	IA_CCL_PRE	IA_CCL_POST	IA_CCR_PRE	IA_CCR_POST	IE_CCL_PRE	IE_CCL_POST	IE_CCR_PRE	IE_CCR_POST
YMS01_	-0.76	-0.76	-1.45	-1.45	1.84	1.84	1.87	1.87
YMS02_	0.39	0.49	0.37	0.57	1.52	2.16	2.14	2.06
YMS03_	0.26	0.54	0.3	0.46	1.91	1.79	1.79	2.21
YMS05_	-1.53	0.16	-0.84	-0.33	2.11	2.06	2.07	2.02
YMS07_	0.44	-0.18	0.27	-0.71	2.01	1.65	1.97	1.94
YMS09_	0.26	0.29	0.3	0.27	1.53	1.8	1.69	1.8
YMS010_	0.54	-0.24	0.53	-0.38	1.99	2.16	2.1	2.01
YMS011_	0.25	-0.01	0.26	0.24	1.76	1.39	1.58	1.82
YMS012_	0.33	0.32	0.31	0.28	2.16	1.76	2.09	1.89
YMS013_	0.6	-0.01	0.37	0.19	1.92	1.91	2.02	1.77
YMS015_	0.62	0.64	0.29	0.49	1.73	1.84	1.73	1.29
YMS017_	0.38	0.34	0.36	0.27	2.15	1.98	1.88	2.11
YMS020_	0.31	0.27	0.35	0.37	2.02	1.7	1.76	2.02
YMS021_	-1.02	0.24	-0.14	0.49	1.96	1.65	1.86	1.93
YMS022_	0.19	0.33	0.43	0.33	1.59	2	1.96	1.9
YMS023_	0.37	0.27	0.38	0.18	1.78	2.08	1.73	1.4
YMS024_	-0.82	0.86	-1.84	0.9	2	2.18	1.95	1.87
YMS025_	0.43	0.5	0.51	0.57	2.08	2.14	1.93	1.95
YMS026_	0.39	0.49	0.54	0.46	2.08	2.13	2.1	1.98
YMS027_	0.21	-0.27	-0.08	-0.38	1.82	1.67	1.98	1.78
YMS028_	0.19	-0.39	0.23	0.49	1.74	1.78	1.9	1.98
YMS029_	0.38	0.37	0.26	0.42	1.87	1.75	1.69	2.06
YMS030_	-0.54	-0.26	-0.72	-0.34	1.67	1.51	1.95	2.11

Table 2: Raw data of cotton experiment on Integral area and Integral entropy

Code	IA_CEL_PRE	IA_CEL_POST	IA_CER_PRE	IA_CER_POST	IE_CEL_PRE	IE_CEL_POST	IE_CER_PRE	IE_CER_POST
YMS01_	-0.04	-0.11	0.08	-0.59	1.74	1.63	1.32	1.73
YMS02_	0.28	0.96	0.33	0.76	1.65	2.09	1.55	2.23
YMS03_	0.47	0.13	0.47	-0.14	1.95	1.8	2.03	1.77
YMS05_	-0.99	0.37	-0.92	0.09	1.97	2.06	1.9	1.64
YMS07_	0.26	0.31	0.23	0.17	1.7	1.87	1.4	1.71
YMS09_	0.6	0.17	0.47	0.49	2	1.73	2.06	2.06
YMS010_	0.09	0.06	0.44	0.06	1.66	1.37	2.22	1.57
YMS011_	0	-0.64	0.33	0.27	1.45	1.81	1.72	1.97
YMS012_	0.29	0.32	0.39	0.18	2	2.15	2.12	2.04
YMS013_	-0.45	0.35	-0.64	0.19	1.65	2.05	1.93	2.06
YMS015_	0.41	0.31	0.19	0.35	1.56	1.52	1.39	1.65
YMS017_	0.44	0.53	0.31	0.5	1.73	2.02	1.42	1.59
YMS020_	0.53	0.61	0.77	0.7	2.21	2.11	2.06	1.83
YMS021_	-0.28	0.36	-0.42	0.98	2.1	1.46	1.54	1.77
YMS022_	0.11	0.14	0.32	0.16	1.84	1.65	1.97	1.87
YMS023_	0.42	0.46	0.54	0.55	2.11	2.05	2.06	2.03
YMS024_	0.24	0.11	0.75	0.23	1.71	1.8	1.81	1.92
YMS025_	0.37	0.44	0.36	0.49	1.69	2.06	2.08	1.87
YMS026_	0.6	-0.03	0.38	-0.77	2.12	1.94	2	2.04
YMS027_	0.34	0.36	0.6	0.57	1.83	1.53	2.11	1.97
YMS028_	-0.48	0.18	-0.37	-0.04	2.09	1.9	1.83	2.1
YMS029_	0.34	0.52	0.48	0.11	1.9	1.59	1.9	1.83
YMS030_	0.5	0.17	0.28	0.1	1.89	1.89	1.87	1.76

Table 3: Raw data of Kuça control on Integral area and Integral entropy

Code	IA_KCL_PRE	IA_KCL_POST	IA_KCR_PRE	IA_KCR_POST	IE_KCL_PRE	IE_KCL_POST	IE_KCR_PRE	IE_KCR_POST
YMS01_	-0.06	-0.07	-0.72	-0.33	1.89	1.89	2.06	1.62
YMS02_	0.58	0.5	0.59	0.51	2.16	2.2	2.08	2.18
YMS03_	0.55	0.33	0.51	0.36	1.86	2.09	2	1.73
YMS05_	0.27	0.33	0.36	0.08	2.12	1.79	1.84	1.89
YMS07_	0.22	0.11	-0.01	0.04	1.8	1.88	1.86	1.74
YMS09_	-0.85	0.14	-0.72	-0.45	1.89	1.7	2.02	1.9
YMS010_	-1.08	-1.36	-0.37	-0.38	2.06	1.86	2.05	2.07
YMS011_	0.07	-0.2	0.43	0.61	1.96	2.03	1.83	1.46
YMS012_	0.33	0.36	0.35	0.37	1.92	2.11	1.96	1.94
YMS013_	0.2	0.2	-0.04	-0.04	1.73	1.73	2.05	2.05
YMS015_	0.62	-0.25	-0.03	-0.25	1.51	1.88	2.06	2.09
YMS017_	0.34	0.38	-0.21	0.2	2.24	2.12	1.96	1.71
YMS020_	0.24	0.07	-0.12	-0.57	1.39	1.52	1.61	2.03
YMS021_	0.53	0.38	0.4	0.49	2.06	2.17	1.92	1.87
YMS022_	0.31	0.36	0.28	0.38	1.79	2.13	2.04	1.51
YMS023_	0.38	0.41	0.35	0.48	2.07	1.99	1.44	1.72
YMS024_	0.08	0.44	0.37	-0.17	1.95	1.42	1.72	2.02
YMS025_	0.2	0.51	0.38	-0.19	1.63	1.76	1.7	2.06
YMS026_	0.24	0.43	0.54	0.56	1.81	2.15	1.78	2.16
YMS027_	0.27	0.49	0.2	0.57	1.7	1.69	1.95	1.81
YMS028_	-0.69	-0.44	-0.64	-0.34	1.97	2.06	2.01	1.72
YMS029_	0.56	0.11	0.69	-0.05	1.99	1.49	2.08	1.81
YMS030_	0.67	0.66	-0.21	0.47	1.95	1.91	1.86	1.89

Table 4: Raw data of Kuça experiment on Integral area and Integral entropy

Code	IA_KEL_PRE	IA_KEL_POST	IA_KER_PRE	IA_KER_POST	IE_KEL_PRE	IE_KEL_POST	IE_KER_PRE	IE_KER_POST
YMS01_	0.73	-0.08	-0.13	-0.82	2.18	1.78	1.64	1.57
YMS02_	-0.28	0.48	-0.59	0.3	1.88	1.59	1.92	2
YMS03_	0.28	0.56	0.39	0.48	1.44	2.08	2.1	2.12
YMS05_	0.36	0.06	0.45	-0.11	1.58	1.51	1.79	1.91
YMS07_	0.28	0.29	0.03	-0.41	1.49	1.57	1.57	1.8
YMS09_	-0.7	-0.59	-0.4	-0.83	1.9	1.9	2.16	2.02
YMS010_	-1.65	-0.08	-1.99	0.03	1.84	1.98	1.65	1.79
YMS011_	0.25	0.02	0.47	0.5	1.54	1.45	1.68	1.63
YMS012_	0.2	-0.12	0.32	-0.86	2.13	1.7	2.05	2.03
YMS013_	0.36	0.25	0.31	0.18	1.93	2.1	1.81	1.86
YMS015_	0.36	0	-0.11	0.03	1.76	1.91	1.75	1.56
YMS017_	0.44	0.3	0.16	0.19	2.06	1.7	1.69	2.18
YMS020_	0.19	0.29	0.32	0.5	1.92	1.65	1.9	2.03
YMS021_	1.2	0.94	0.85	0.74	1.62	1.81	1.94	2.12
YMS022_	0.24	0.25	0.42	0.44	1.6	1.58	2.18	2.12
YMS023_	-0.41	-0.64	-0.68	-0.74	1.81	1.79	2.06	1.89
YMS024_	0.75	0.67	0.48	0.64	2.09	1.96	2.2	1.99
YMS025_	0.52	0.52	0.48	0.36	2.14	2.12	1.92	1.77
YMS026_	0.59	0.25	0.79	0.55	1.92	1.83	2.08	1.96
YMS027_	-0.05	-0.01	0.29	0.49	1.49	1.83	1.95	2.05
YMS028_	0.22	0.57	0.06	0.54	1.49	1.93	1.9	1.96
YMS029_	0.2	0.16	0.37	0.44	1.74	1.58	1.96	1.9
YMS030_	0.7	0.48	0.81	0.39	2.01	1.9	2.12	1.98

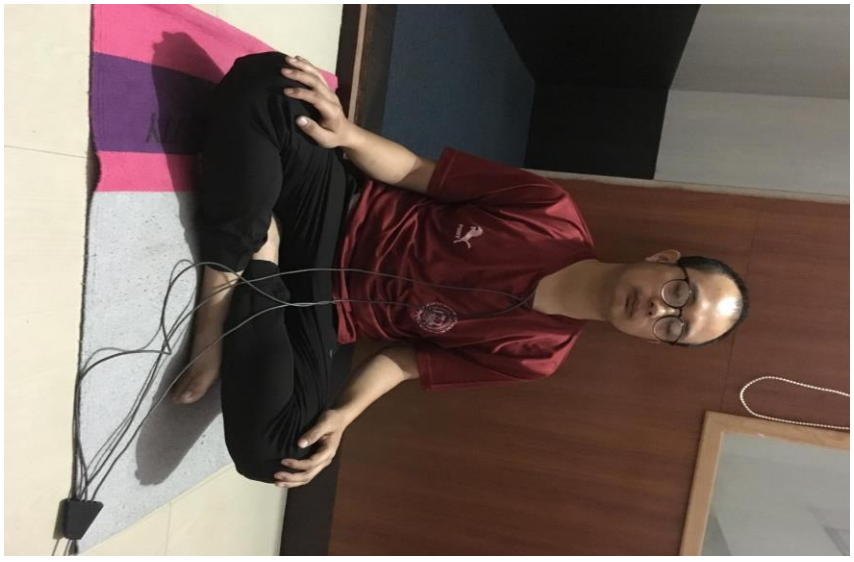
able 5: Raw data of rubber control on Integral area and Integral entropy

Code	IA_RCL_PRE	IA_RCL_POST	IA_RCR_PRE	IA_RCR_POST	IE_RCL_PRE	IE_RCL_POST	IE_RCR_PRE	IE_RCR_POST
YMS01_	-0.47	0.47	-1.49	0.52	2.04	1.95	1.89	2.06
YMS02_	0.34	0.45	0.17	0.53	1.68	2.2	2.07	2.1
YMS03_	0.53	0.55	0.69	0.55	1.65	1.68	2.01	1.95
YMS05_	-0.45	0.02	-0.78	-0.11	1.86	1.43	2.1	1.44
YMS07_	0.17	0.42	0.28	-0.28	1.73	1.31	1.99	1.58
YMS09_	0.26	0.92	-0.44	0.33	1.64	1.92	2.03	1.88
YMS010_	0.26	-0.69	-0.44	-0.21	1.64	2.15	2.03	2.07
YMS011_	-0.49	0.57	0.3	0.73	2	1.91	1.4	1.79
YMS012_	0.36	0.35	0.32	0.29	2.11	2.15	1.98	1.87
YMS013_	0	-0.59	-0.03	-0.64	1.87	1.98	1.59	2.19
YMS015_	0.02	0.27	-0.49	-0.05	1.73	1.38	1.8	1.46
YMS017_	0.46	0.5	0.45	0.45	2.19	2.16	2.17	2.06
YMS020_	0.31	0.27	0.35	0.37	2.02	1.7	1.76	2.02
YMS021_	0.55	0.47	0.54	0.48	2.17	1.68	2.1	2.17
YMS022_	0.28	0.12	0.28	0.12	1.93	1.91	2.13	2.08
YMS023_	0.01	0.44	-0.52	0.29	1.54	2.16	1.83	1.28
YMS024_	0.74	0.51	0.65	0.32	1.85	2.16	2.17	1.92
YMS025_	0.56	0.64	0.51	0.87	1.95	1.7	2.07	2
YMS026_	0.36	0.27	0.53	0.1	2.06	1.89	1.95	1.52
YMS027_	0.04	0.41	-0.11	0.31	1.59	1.91	2.08	1.87
YMS028_	-0.13	0.41	-0.28	0.38	1.79	2.06	1.61	1.92
YMS029_	0.44	0.47	0.46	0.53	2.07	1.72	1.86	2.23
YMS030_	-0.45	0.08	-0.85	-0.32	1.76	1.72	2.1	1.92

Table 6: Raw data of rubber experiment on Integral area and Integral entropy

Code	IA_REL_PRE	IA_REL_POST	IA_RER_PRE	IA_RER_POST	IE_REL_PRE	IE_REL_POST	IE_RER_PRE	IE_RER_POST
YMS01_	0.77	0.15	0.72	-0.37	1.93	1.59	2.05	1.73
YMS02_	0.25	0.38	0.35	0.47	1.81	2.03	2.09	1.94
YMS03_	0.22	0.36	0.12	0.75	1.49	2	1.85	2.11
YMS05_	-0.03	0.27	0.39	0.08	2	2.09	2.04	2.06
YMS07_	0.26	-0.48	0.2	-0.61	1.95	1.92	1.52	1.7
YMS09_	-0.97	0.15	-0.88	0.34	2.04	1.48	2.01	1.65
YMS010_	-1.62	-0.48	-1.06	0.88	2.14	1.93	2.13	1.97
YMS011_	0.42	-0.28	0.96	0.89	1.93	1.83	2.16	1.71
YMS012_	0.34	0.27	0.35	-0.05	2.05	1.86	1.98	2.02
YMS013_	0.34	0.1	0.01	-0.73	1.99	1.43	1.89	1.96
YMS015_	0.32	0.33	0.29	0.1	1.84	1.62	1.37	1.62
YMS017_	0.5	0.41	0.45	0.4	2.12	1.89	1.34	2.19
YMS020_	0.5	0.29	0.68	0.36	2.1	1.81	1.93	1.87
YMS021_	0.03	0.49	-0.25	0.34	1.49	1.82	1.8	2.03
YMS022_	0.19	0.39	0.07	0.38	1.68	1.79	1.7	2.07
YMS023_	-0.45	0.1	-0.31	-0.76	1.91	1.39	1.7	2.09
YMS024_	-0.82	0.94	-0.87	0.57	2.18	2.05	2.11	1.73
YMS025_	0.51	0.54	0.43	0.29	2.01	1.95	2.13	1.89
YMS026_	0.46	0.54	0.56	0.35	2.13	1.4	1.97	1.79
YMS027_	-0.59	0.11	-0.86	-0.2	2.11	2.02	2.09	1.89
YMS028_	-0.21	0.4	-0.03	-0.02	1.75	2.13	1.99	1.78
YMS029_	0.22	-0.12	0.01	-0.92	1.83	1.7	1.95	2.12
YMS030_	0.12	-0.2	-0.14	-0.54	1.64	1.74	1.86	2.05

10.2 Appendix 2- Images of the Experiment



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