

## Experimental study to evaluate *haemodynamic* action of *herbo-mineral* compounds

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|   |  |                     |                     |                     |              |              |          |               |               |          |                       |                       |         |                |                |         |
|---|--|---------------------|---------------------|---------------------|--------------|--------------|----------|---------------|---------------|----------|-----------------------|-----------------------|---------|----------------|----------------|---------|
| <div><div>*Corresponding author:<br/>Mob. No.: +91 9892875494;<br/>Email:<br/>apoorvasane7@gmail.com</div><div>How to Cite this article:<br/>Experimental study to<br/>evaluate <i>haemodynamic</i><br/>action of <i>herbo-mineral</i><br/>compounds/Sane Apoorva<br/>Prashant/Ayurlog: National<br/>Journal of Research In<br/>Ayurved Science 2019; 3(2):<br/>pages: 01 -08</div><div>Ethical approval:<br/>Approved by the Institutional<br/>ethics committee</div><div>Conflict of Interest:<br/>None declared</div><div>Sources of Funding: None</div><div>Date of Submission:<br/>28/02/2019.</div><div>Date of Peer Review:<br/>5/03/2019.</div><div>Date of Acceptance:<br/>24/03/2019.</div><div>Date of Publishing:<br/>01/04/2019.</div><div>Keywords:<br/><i>Herbomineral compounds,<br/>rasabhasma,<br/>haemodynamic effect</i></div><div>Name of Publication<br/><i>Dudhamal Publications<br/>(OPC) Pvt. Ltd., Chembur,<br/>Mumbai, Maharashtra, India</i></div></div> <tr><td><div>Abstract:<br/><br/><b>Aim:</b> Every ¼ individuals die due to cardiac failure. Cardiac diseases are increasing and ranks 1<sup>st</sup> in top 10 causes of death as per WHO. In order to increase life span and mortal period we must find an alternative treatment and so we have the rich ancient wisdom from <i>Ayurveda</i>. We have to utilize this knowledge scientifically so that we can understand their action and use them to cure diseased person. <b>Objective:</b> To evaluate the <i>heamodynamic</i> action of herbo-mineral compound in healthy individual. <b>Material &amp; Method:</b> Four healthy individuals were selected for the study. Each healthy individual consumed a different <i>bhasma</i> and post consumption the following parameters were checked Heart Rate (HR), Systolic blood pressure (SBP), Stroke volume (SV), Cardiac output(CO), Systemic vascular resistance (SVR); were recorded at intervals of immediately after consumption, after 1 hour and after 2 hours. <i>Rasa bhasma</i> administered <i>tamra bhasma</i>, <i>abhrak bhasma</i>, <i>suvarna makshik bhasma</i>, <i>mauktik bhasma</i>. <b>Method Of Evaluation:</b> Deviation in parameters was observed from normal standard value leading to conclusion of heamodynamic effect.<br/><br/><b>Result:</b><table><tr><td>Sr no</td><td>Bhasma name</td><td>Chronotropic effect</td></tr><tr><td>1.</td><td>Tamra bhasma</td><td>Positive</td></tr><tr><td>2.</td><td>Abhrak bhasma</td><td>Negative</td></tr><tr><td>3.</td><td>Swarna makshik bhasma</td><td>Neutral</td></tr><tr><td>4.</td><td>Mauktik bhasma</td><td>Neutral</td></tr></table><b>Conclusion:</b> <i>Herbomineral</i> compounds have a significant <i>haemodynamic</i> effect on the human body.</div></td></tr> | <div>Abstract:<br/><br/><b>Aim:</b> Every ¼ individuals die due to cardiac failure. Cardiac diseases are increasing and ranks 1<sup>st</sup> in top 10 causes of death as per WHO. In order to increase life span and mortal period we must find an alternative treatment and so we have the rich ancient wisdom from <i>Ayurveda</i>. We have to utilize this knowledge scientifically so that we can understand their action and use them to cure diseased person. <b>Objective:</b> To evaluate the <i>heamodynamic</i> action of herbo-mineral compound in healthy individual. <b>Material &amp; Method:</b> Four healthy individuals were selected for the study. Each healthy individual consumed a different <i>bhasma</i> and post consumption the following parameters were checked Heart Rate (HR), Systolic blood pressure (SBP), Stroke volume (SV), Cardiac output(CO), Systemic vascular resistance (SVR); were recorded at intervals of immediately after consumption, after 1 hour and after 2 hours. <i>Rasa bhasma</i> administered <i>tamra bhasma</i>, <i>abhrak bhasma</i>, <i>suvarna makshik bhasma</i>, <i>mauktik bhasma</i>. <b>Method Of Evaluation:</b> Deviation in parameters was observed from normal standard value leading to conclusion of heamodynamic effect.<br/><br/><b>Result:</b><table><tr><td>Sr no</td><td>Bhasma name</td><td>Chronotropic effect</td></tr><tr><td>1.</td><td>Tamra bhasma</td><td>Positive</td></tr><tr><td>2.</td><td>Abhrak bhasma</td><td>Negative</td></tr><tr><td>3.</td><td>Swarna makshik bhasma</td><td>Neutral</td></tr><tr><td>4.</td><td>Mauktik bhasma</td><td>Neutral</td></tr></table><b>Conclusion:</b> <i>Herbomineral</i> compounds have a significant <i>haemodynamic</i> effect on the human body.</div> | Sr no               | Bhasma name         | Chronotropic effect | 1.           | Tamra bhasma | Positive | 2.            | Abhrak bhasma | Negative | 3.                    | Swarna makshik bhasma | Neutral | 4.             | Mauktik bhasma | Neutral |
| <div>Abstract:<br/><br/><b>Aim:</b> Every ¼ individuals die due to cardiac failure. Cardiac diseases are increasing and ranks 1<sup>st</sup> in top 10 causes of death as per WHO. In order to increase life span and mortal period we must find an alternative treatment and so we have the rich ancient wisdom from <i>Ayurveda</i>. We have to utilize this knowledge scientifically so that we can understand their action and use them to cure diseased person. <b>Objective:</b> To evaluate the <i>heamodynamic</i> action of herbo-mineral compound in healthy individual. <b>Material &amp; Method:</b> Four healthy individuals were selected for the study. Each healthy individual consumed a different <i>bhasma</i> and post consumption the following parameters were checked Heart Rate (HR), Systolic blood pressure (SBP), Stroke volume (SV), Cardiac output(CO), Systemic vascular resistance (SVR); were recorded at intervals of immediately after consumption, after 1 hour and after 2 hours. <i>Rasa bhasma</i> administered <i>tamra bhasma</i>, <i>abhrak bhasma</i>, <i>suvarna makshik bhasma</i>, <i>mauktik bhasma</i>. <b>Method Of Evaluation:</b> Deviation in parameters was observed from normal standard value leading to conclusion of heamodynamic effect.<br/><br/><b>Result:</b><table><tr><td>Sr no</td><td>Bhasma name</td><td>Chronotropic effect</td></tr><tr><td>1.</td><td>Tamra bhasma</td><td>Positive</td></tr><tr><td>2.</td><td>Abhrak bhasma</td><td>Negative</td></tr><tr><td>3.</td><td>Swarna makshik bhasma</td><td>Neutral</td></tr><tr><td>4.</td><td>Mauktik bhasma</td><td>Neutral</td></tr></table><b>Conclusion:</b> <i>Herbomineral</i> compounds have a significant <i>haemodynamic</i> effect on the human body.</div>  | Sr no  | Bhasma name         | Chronotropic effect | 1.                  | Tamra bhasma | Positive     | 2.       | Abhrak bhasma | Negative      | 3.       | Swarna makshik bhasma | Neutral               | 4.      | Mauktik bhasma | Neutral        |         |
| Sr no   | Bhasma name  | Chronotropic effect |                     |                     |              |              |          |               |               |          |                       |                       |         |                |                |         |
| 1.  | Tamra bhasma   | Positive            |                     |                     |              |              |          |               |               |          |                       |                       |         |                |                |         |
| 2.  | Abhrak bhasma  | Negative            |                     |                     |              |              |          |               |               |          |                       |                       |         |                |                |         |
| 3.  | Swarna makshik bhasma  | Neutral             |                     |                     |              |              |          |               |               |          |                       |                       |         |                |                |         |
| 4.  | Mauktik bhasma   | Neutral             |                     |                     |              |              |          |               |               |          |                       |                       |         |                |                |         |

## INTRODUCTION:

Cardiac diseases are increasing and ranks 1<sup>st</sup> in top 10 causes of death as per World Health Organization. 17.5 million people die with Cardio-Vascular Disease (CVD) with more than 75% of CVD occur in low income and middle income countries.<sup>[1]</sup> The prevalence of Hypertension is projected to increase from 118 million(2000)-214 million(2025). After 5 years the incidence of heart failure (HF) based upon 5% obesity prevalence estimates, the total no of HF patients accrued could range from 900000-1.5 million ; with an estimated 50% mortality at 5years , the prevalence of HF due to obesity alone could be estimated to range from 450000 – 750000<sup>[2]</sup>

In order to increase life span and mortal period we must find an alternative treatment and so we have the rich ancient wisdom from Ayurveda. We have to utilize this knowledge scientifically so that we can understand their action and use them to cure diseased person. Ayurveda is an ancient system of medicine, which has become famous in the present times because of its efficacy and the ability to cure chronic diseases which are sometimes termed as incurable by others. Ayurveda seeks to heal the fragmentation and disorder of the mind-body complex and restore wholeness and harmony to all people. Ayurveda has been blessed with abundant natural herbs and metals that work in sync with the body functions, protect, and prevent any undue damage to the body cells. Heart is the main body organ which pumps day and night to make oxygen available to all the body organs and especially to the brain. In order to do so a constant blood pressure against the lateral walls of the

arteries has to be maintained. The Ayurvedic herbo-mineral compounds help the blood pressure in a proper order so as to make the functioning of the heart easy and comfortable. In certain cases the deposition of plaque and cholesterol any alter the functioning of the heart. The Ayurvedic herbo-mineral compounds help remove the cholesterol plaques from the walls of the arteries so as to maintain a constant flow of blood.

Ayurveda uses the inherent power of these herbo-mineral compounds to bring about wonderful results on the human body. The herbo-mineral compounds for congestive heart failure and heart strength help maintain a good heart rate and a normal blood pressure. Herbo-mineral compounds have been already explained in Ayurveda but there is lack of scientific evidences on its effect on Cardio-Vascular System and so I intend to study the same.

“*Na cha Rasashastram  
Dhatuvaadaarthameva iti manthavyam |  
dehavedadwara muktireva  
paramaprayojanaath ||*”<sup>[3]</sup>

Rasashastra, a branch of ayurvedic pharmaceuticals that deals with minerals, metals, precious stones, certain poisonous herbs and their processing very largely derived its color, flavor and its nourishment from the tantric cult. In almost every country the progress of chemistry can be traced to medicine. The specialized procedures or *samskaras* like *shodhan* , *maaran*, *satvapaatan*, *amruteekaran* etc were developed and the result of which would be the ultimate formulations or *yogas* like *Bhasmas*, *kupipakwa rasayanas*, *parpati*, *pottali* etc. All these came under one roof called *Rasaushadies*. Due to their small dose, quick effectiveness, tastelessness, effectiveness on dreadful diseases and

long shelf life, *Rasaushadies* occupied a superior status among ayurvedic medicine. In fact, Rasashastra is an expansion of *Rasayana* therapy.

### OBJECTIVE:

To evaluate the haemodynamic action of herbo-mineral compound in healthy individual.

1. Heart Rate (HR) : All-cause mortality seems to be higher in individuals with elevated heart rates. Among individuals with hypertension, a positive association between heart rate and cardiovascular diseases, particularly coronary heart disease and sudden death, has also been shown even after exclusion of early deaths, confirming that heart rate is an independent predictor of fatal events and not only an indicator of pre-existing illness. High heart rate at rest increases cardiac morbidity and mortality through promotion of atherosclerosis through pulsatile shear stress and an increase in myocardial ischemia through an imbalance of oxygen supply and demand.
2. Systolic Blood Pressure (SBP) : Cardio-Vascular mortality increased with the SBP level. [4] SBP is a stronger predictor of coronary heart disease than Diastolic Blood Pressure (DBP) [5]
3. Stroke volume (SV) : Stroke is the second leading cause of death across the globe, although the mortality rate is starting to decline. More than three quarters of people who suffer a stroke survive for a

year and over half survive for more than five years. Many people who survive a stroke recover their independence, although around one quarter are left living with minor disability and around 40% have more severe disabilities. [6]

4. Cardiac Output (CO) : Cardiac output is the strongest independent hemodynamic correlate of in-hospital mortality in patients with cardiogenic shock. Increasing age and female gender are independently associated with lower cardiac output. [7]
5. Systemic Vascular Resistance (SVR): Five to ten percent of patients who present with an acute myocardial infarction (MI) are in cardiogenic shock. Although the mortality from cardiogenic shock has decreased somewhat in the last decade, it is still greater than 50%.

Therefore, by use of herbo-mineral compounds, this mortality rate can be brought down and also prevention of death at a relatively young age due to CVD can be possible.

### MATERIALS AND METHOD :

1. **TEST DRUG** : Readymade *bhasma* of Dhootpapeshwar Company were used.

- A. TAMRA BHASMA : The '*ashuddha tamra patra*' are thickly applied on either side with the paste prepared by triturating required quantities of '*saindhava lavana*' and '*nimbu swaras*' together. The *patra* are heated red hot and dipped in *amla kanji* for 8 times. And we obtain "*shuddha tamra*" [8]

Then one part each of '*shodhit tamrapatra*', '*shuddha parad*' & '*shuddha gandhak*' are taken. First, *kajjali* of '*shuddha parad*' and '*shuddha gandhak*' is prepared. The *kajjali* is triturated with required quantity of '*nimbu swaras*' and is applied over the '*shuddha tamra patra*' and are sundried. Later they are enclosed in '*sharav samputa*' and subjected for '*one gajaputa*'. Likewise, three '*gajaputa*' are given by repeating the entire procedure. After 3<sup>rd</sup> *gajaputa*, we obtain properly prepared '*tamra bhasma*' which will be fit for *amruteekaran*.<sup>[9]</sup>

Properly prepared '*tamra bhasma*' is triturated thoroughly with required quantity of '*kumari swaras*', sundried, enclosed in '*sharav samputa*' and is subjected to '*varahaputa*'. This entire procedure is repeated for seven times. By this, we obtain '*tamra bhasma*', which is free from any form of toxicity.<sup>[10]</sup>

- B. ABHRAK BHASMA: Thin sheets of '*ashuddha krishna abhrak*' are heated red hot and dipped in '*go dugdha*'. This procedure is repeated seven times to obtain '*shuddha abhrak*'.<sup>[11]</sup>

To obtain '*abhrak bhasma*', which is effective in curing all ailments, the *shuddha abhrak* has to be subjected to a minimum of *dashputa* to maximum of *shatputa*. And for '*rasayan*' purpose it must be subjected for a minimum of *shatputa* to maximum *sahastaputa*.<sup>[12]</sup>

Equal quantities of '*shuddha abhrak bhasma*' and '*go ghrit*' are taken in an iron vessel kept on mild fire and cooked with frequent stirring until all the moisture is lost. The dry powder of '*abhrak bhasma*' is used.<sup>[13]</sup>

- C. SWARNA MAKSHIK BHASMA :

The pieces of '*ashuddha swarna makshik*' are heated red hot and dropped in a vessel containing freshly prepared '*triphala kwath*'. The procedure is repeated for seven times to obtain '*shuddha swarna makshik*'.<sup>[14]</sup>

One part each of '*shuddha swarna makshik*', '*shuddha gandhak*' along with required quantity of '*nimbu swaras*' and are triturated well in *khavla yantra* to prepare '*chakrika*' are sundried and enclosed in '*sharav samputa*' subjected to '*varahaputa*'. This entire procedure is repeated 5 times. After the fifth *puta* cools down on its own, the properly prepared, red colored '*swarna makshik bhasma*' inside the '*samputa*' is collected and used.<sup>[15]</sup>

- D. MAUKTIK BHASMA : The roughly pounded '*mauktik*' is tied in a *pottali* and subjected for 1 *yama* of '*swedan*' in '*dolayantra*' in '*jayanti swaras*'. Later it is dried and used for further procedure.<sup>[16]</sup>

This *shuddha mauktik* is pounded to fine powder and is added with equal quantity of '*go dugdha*', triturated thoroughly and later sundried. This dry powder is enclosed in *sharav samputa* and subjected for one '*laghuputa*'. This

entire procedure is repeated for three times to obtain appropriately prepared 'mauktik bhasma'.<sup>[17]</sup>

**2. DOSAGE:** 250 mg for one time.

**3. SUBJECTS:** Four healthy individuals of age group 18-24 years, not consuming any medications for CVD like hypertension nor having undergone any Coronary Artery Bypass Graft(CABG) or angioplasty were selected.

#### **4. PROCEDURE :**

I carried out this experiment at Madhavbaug Ayurvedic Cardiac Rehabilitation Centre, Khopoli where I was provided with "CARDIAC OUTPUT MONITOR" to monitor following parameters of the healthy individuals:

1. Heart Rate
  2. Systolic Blood Pressure
  3. Stroke Volume
  4. Cardiac Output
  5. Systemic Vascular Resistance
- recorded at intervals of :
1. Consumption
  2. After 1 hour

3. After 2 hours

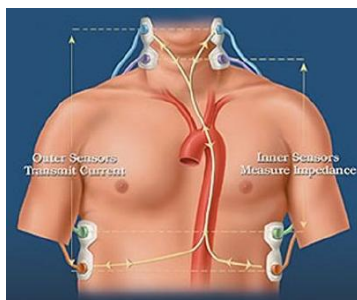
*Rasa bhasma* administered :

1. *Tamra bhasma*
2. *Abhrak bhasma*
3. *Suvarna makshik*
4. *Mauktik bhasma*

#### **Proceedings**

1. Healthy subject volunteer with age of 18 to 24 years were selected.
2. Consent form was taken.
3. 250 mg of one of the bhasma was given to each subject post food.
4. Blood pressure was taken at rest and noted down.
5. Leads of cardiac output monitor device were placed bilaterally as described in given diagram below.
6. Patient's age in years, weight in kg and height in meter were put in device.
7. CO monitor started showing all haemodynamic parameters, base line parameters were noted.
8. Changes in their haemodynamic parameter were assessed on consumption, at 1 hour and 2 hours interval.
9. The data was captured in MS office excel.

#### **RESULT:**



| No. | Name      | Age | Weight | height | BMI   | Bhasma          | HR   |       |       | SV      |         |         |
|-----|-----------|-----|--------|--------|-------|-----------------|------|-------|-------|---------|---------|---------|
|     |           |     |        |        |       |                 | 0    | 1     | 2     | 0       | 1       | 2       |
| 1   | Subject 1 | 18  | 52     | 1.66   | 18.87 | Tamra           | 74.3 | 68.33 | 77.33 | 88.2    | 61.7    | 77.23   |
|     |           |     |        |        |       |                 |      |       |       |         |         |         |
| 2   | Subject 2 | 21  | 51     | 1.64   | 18.96 | Abhrak          | 54.7 | 55.66 | 48.66 | 86.6    | 67.9    | 58.26   |
|     |           |     |        |        |       |                 |      |       |       |         |         |         |
| 3   | Subject 3 | 20  | 48     | 1.59   | 18.99 | Suvarna Makshik | 76.3 | 75    | 72    | 72      | 56.33   | 55.06   |
|     |           |     |        |        |       |                 |      |       |       |         |         |         |
| 4   | Subject 4 | 22  | 49     | 1.65   | 17.99 | Mauktik         | 64.7 | 61    | 64.33 | 91.56   | 42.11   | 77.86   |
|     |           |     |        |        |       |                 |      |       |       |         |         |         |
| No. | Name      | Age | weight | height | BMI   | Bhasma          | SBP  |       |       | DBP     |         |         |
|     |           |     |        |        |       |                 | 0    | 1     | 2     | 0       | 1       | 2       |
| 1   | Subject 1 | 18  | 52     | 1.66   | 18.87 | Tamra           | 110  | 120   | 120   | 70      | 80      | 72      |
|     |           |     |        |        |       |                 |      |       |       |         |         |         |
| 2   | Subject 2 | 21  | 51     | 1.64   | 18.96 | Abhrak          | 110  | 100   | 90    | 70      | 70      | 70      |
|     |           |     |        |        |       |                 |      |       |       |         |         |         |
| 3   | Subject 3 | 20  | 48     | 1.59   | 18.98 | Suvarna Makshik | 120  | 120   | 130   | 70      | 94      | 90      |
|     |           |     |        |        |       |                 |      |       |       |         |         |         |
| 4   | Subject 4 | 22  | 49     | 1.65   | 17.99 | Mauktik         | 110  | 110   | 100   | 70      | 64      | 70      |
|     |           |     |        |        |       |                 |      |       |       |         |         |         |
| No. | Name      | Age | weight | height | BMI   | Bhasma          | CO   |       |       | SVR     |         |         |
|     |           |     |        |        |       |                 | 0    | 1     | 2     | 0       | 1       | 2       |
| 1   | Subject 1 | 18  | 52     | 1.66   | 18.87 | Tamra           | 4.3  | 4.7   | 5.3   | 3013    | 1489.66 | 1319.66 |
|     |           |     |        |        |       |                 |      |       |       |         |         |         |
| 2   | Subject 2 | 21  | 51     | 1.64   | 18.96 | Abhrak          | 3.76 | 3.33  | 2.66  | 2047.66 | 2117    | 2650    |
|     |           |     |        |        |       |                 |      |       |       |         |         |         |
| 3   | Subject 3 | 20  | 48     | 1.59   | 18.98 | Suvarna Makshik | 5.9  | 4.4   | 3.93  | 1321    | 1588.33 | 1794.33 |
|     |           |     |        |        |       |                 |      |       |       |         |         |         |
| 4   | Subject 4 | 22  | 49     | 1.65   | 17.99 | Mauktik         | 4.66 | 3.4   | 3.6   | 1536.22 | 3732    | 1962    |

## DISCUSSION:

1. Tamra bhasma showed “POSITIVE CHRONOTROPIC” & “NEGATIVE INOTROPIC” effect.

Positive chronotropes increase heart rate used in cases of bradycardia.

Negative inotropes decrease blood pressure, myocardial contractility, and



are used to decrease cardiac workload in conditions such as [angina](#).

Can tamra bhasma be used in conditions where there is low heart rate / high systolic blood pressure / Sino-Atrial bundle block / Atrio-Ventricular blockage? Can it be used instead of dopamine / **Angiotensin-converting enzyme (ACE) inhibitors**?

2. Abhrak bhasma showed “NEGATIVE CHRONOTROPIC” & “NEGATIVE INOTROPIC” effect.

Negative chronotropes decrease heart rate. Negative inotropes decrease myocardial [contractility](#), and are used to decrease cardiac workload.

Used in to manage [cardiac arrhythmias](#), and to protect the heart from a second heart attack ([myocardial infarction](#)) after a first heart attack (secondary prevention). So can it be used in tachycardia's, anginas, hypertension or as a replacement for beta-blockers, [calcium](#) channel blockers?

3. Swarna makshik bhasma showed “NEGATIVE INOTROPIC” effect.

Negative inotropes decrease myocardial [contractility](#), and are used to decrease cardiac workload. Negative inotropism may precipitate or exacerbate heart failure.

Can this bhasma replace certain beta blockers (e.g carvedilol) that have been believed to reduce [morbidity](#) and [mortality](#) in congestive heart failure.

4. Mauktik bhasma showed “NEGATIVE INOTROPIC” effect.

Negative inotropes decrease myocardial [contractility](#), and are used to decrease cardiac workload.

Can it be used in hypertension, atrial fibrillation and also in heart attack patients to reduce stress on the heart and prevent future [heart attacks](#)?

## CONCLUSION:

From above information we can derive the following conclusions :

| Sr. no. | Bhasma name           | Chronotropic effect | Inotropic effect |
|---------|-----------------------|---------------------|------------------|
| 1.      | <i>Tamra bhasma</i>   | positive            | negative         |
| 2.      | <i>Abhrak bhasma</i>  | negative            | negative         |
| 3.      | <i>Swarna makshik</i> | neutral             | negative         |
| 4.      | <i>Mauktik bhasma</i> | neutral             | negative         |

Still a massive scientific research of various herbo-mineral compounds on different systems is needed for better efficacy on disorders where medicine of other pathys could not be that effective and to increase the life span.

## ACKNOWLEDGEMENT:

I am grateful to Dr. Rohit Madhav Sane Sir (C.E.O of Madhavbaug) who play a key role in molding me in the world of Ayurveda and for guiding me in Allopathic concepts, Dr. Rahul Mandole Sir (Sr. Research Associate at Madhavbaug) for allowing me to

ethically conduct the study on healthy individuals.

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