Explore the therapeutic potential of Chamomile and lavender in the management of cortisol levels and blood Pressure

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ABSTRACT

Over the course of weeks or months, high cortisol levels and blood pressure can cause inflammation and a variety of mental and physical health issues, including anxiety, weight gain, and heart disease.Chamomile and lavender are one of the most ancient medicinal herbs and have seductive properties to reduce blood pressure and cortisol level in people with stress. The current study aimed to assess the lavender and chamomile herbs supplementation in reducing cortisol levels and blood pressure. For this purpose,the proximate composition of chamomile and lavender wasperformed.The dried herbs (powder) of both chamomile and lavender in combination with an equal concentrationof 1.2g were simply added to capsules and mixed powder of 2.4 g taken up to 3 times per dayas an organic supplement.Subjectswere divided into two groups G_0 was a control group and G_1 was an experimental group. To assess the cortisol level, the Go value in Starting Trial Phase was 8.27±1.526 and the G1 value was 7.98±1.822. In the end Trial Phase, the Go value was 8.81±1.495 and the G1 value was 6.45±1.78. The experimental supplement prepared with lavender and Chamomilewas also observed on blood pressure readings and proved to have a significant ($p<0.05$) impact.

Keywords: Lavender herb, Chamomile herb, Blood pressure, Cortisol

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Introduction

Lavender is included in ornamental plants specifically English lavender. It is popular because of its bright color, aroma, and low intake of dehydration. It does not thrive in permanently moist soil and can benefit by improving the drainage performance of inorganic coverings such as gravel (Koulivand et al., 2013). It grows best in a Mediterranean climate similar to its natural habitat and is characterized by wet winters and dry summers. It has strong resistance to low temperatures and is generally considered USDA zone 5 resistance. It supports acidic soils but prefers neutral or alkaline soils, which may exist briefly under certain conditions(Cavanagh and Wilkinson 2005).

The plant chamomile has historically been used in a variety of ways to cure a wide range of illnesses, including bronchitis, colic, diarrhea, neuralgia, toothaches, dysmenorrhea, dermatitis, and high blood pressure. Its oil is used for rheumatism, flatulence, and colic, and its flower is also used as a carminative and an antipyretic. Following integration, this plant was used for medical purposes in Egypt before the Flood, Greece, and Rome. Additionally, chamomile is one of the active constituents in several conventional Unani and homeopathic preparations (Srivastava et al., 2010, Singh et al., 2011).

Cortisol is directly linked to stress levels that impact human health and raised various risks in the body including blood pressure(Rafii et al., 2020). Studies have reported that lavender and chamomile put a significant impact on suppressing the cortisol level hence minimizing the risk of stress in the body(Baskran and Lakshmanan 2019, Rafii et al., 2020). Meanwhile, various researches also reported the impact of medicinal herbs in alleviating the blood pressure(Mohammad Aliha et al., 2016, Ghaderi and Solhjou 2020).

TPC and TFC are examples of compounds that act as antioxidants and may protect free radicals, which have been linked to cancer, heart disease, and other disorders, from damaging your cells. When your body digests food, when a person exposed to radiation or cigarette smoke, or when you do both, free radicals are molecules that are produced.Free radicals are countered by antioxidants by sacrificing some of their electrons. They serve as a natural "off" switch for the free radicals by making this sacrifice. This aids in stopping a chain reaction that may have an impact on other cellular molecules and other cells across the body (Basavegowda et al., 2021).

This research was aimed to measure the proximate analysis of targeted herbs (lavender and chamomile). This study also investigated the medicinal impact of lavender and chamomile in minimizing the cortisol level and maintaining the blood pressure.

Materials and Methods

Procurement and preparation of raw material

This research has been carried out at the school of dietetics and nutrition science, The University of Faisalabad, Punjab, Pakistan. The raw material (lavender herbs and chamomile) in the dry form was collected from the Nishat Agriculture farm, Pindibhatian, Pakistan. The herbs were washed with lukewarm water thoroughly to remove the dust particles or any dirty foreign material linked to them. After washing, the herbs were dried at room temperature under the shed and then crushed these herbs and turned into fine powder. The resultant powder was filled in a capsule having the size of “735mg” followed by the method described byTadhani and Subhash (2006).

Proximate analysis

According to the AOAC methods, the dried crushed herbs of Lavender and Chamomile were analyzed for moisture content, ash, crude fiber, carbohydrates, crude protein, and nitrogen-free extract (AOAC 2000).

Moisture Content determination

By drying the sample in a hot air oven (Model: DO-1-30/02, PCSIR, Pakistan) at 1055 o C until the weight/mass of the sample became maintained, the moisture content was determined in accordance with AOAC Method No. (AOAC, 2000).

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$$\text{Moisture \%} = \frac{\text{loss of weight (W1)}}{\text{weight of sample (W2)}}\ x\ 100$$

Total Ash

Direct burning up of a sample that was obtained in the crucible in accordance with (AOAC., 2000). The crucible was heated on an oxidizing flame until it produced no smoke, and it was subsequently ignited at 550oC in a muffle furnace (MF-1/02, PCSIR, Pakistan) to produce grayish-white residue.

$$\text{Ash (\%)} = \frac{\text{weight of crucible (W1)} - \text{weight of empty crucucible(W2)}}{\text{weight of sample (S)}}\ x\ 100$$

Crude fiber

Using LabconcoFibertech, the crude fibre of the sample was assessed after a fatless sample was taken (Labconco Corporation Kansas, USA). Fiber % was determined using (AOAC,2000).

$$\text{CF\%} = \frac{\text{weight of dried residue (W1)} - \text{weight of ash(W2)}}{\text{weight of sample (S)}}\ x\ 100$$

Crude Fat

The fats content in dried powdered sample was determined by soxhletextraction apparatus as per the procedure described in AOAC (2000).

$$Fat\ (\%) = \frac{Weight\ of\ beaker\ and\ fat\ residue\ (W1) - Weight\ of\ beaker\ (W2)}{Weight\ of\ Sample\ (S)}\ x\ DM\ (\%)$$

$$DM\ (\%) = \frac{Weight\ of\ dry\ matter\ (W1)}{Weight\ of\ Sample\ (W2)}\ x\ 100$$

Crude Protein

The protein content of the sample was estimated by using Kjeltech Apparatus (Model: D-40599, Behr Labor Technik, Gmbh-Germany) as per the procedure described in AOAC (2000).

$$\text{N\%} = \frac{\text{volume of N/10 H2SO4 used x 0.0014 x vol of sample dilution}}{\text{weight of sample x volume of sample solution used (10ml)}} x\ 100$$

$$\text{CP\%} = \text{N\% x 6.25}$$

Carbohydrates

The total number of carbohydrates of the sample was also be analyzed through AOAC (2000).

$$\text{Total carbohydrate} = 100 - (\%\text{fat} + \%\text{fiber} + \%\text{ash} + \%\text{ protein})$$

Nitrogen free extract (NFE)

The NFE was calculated by using the given expression:

NFE = 100 – (% moisture + % crude protein + % crude fat + % crude fiber + % ash)

Antioxidant (TPC and TFC) Analysis of chamomile and lavender powder

With slight adjustments, Singleton et al. (1999) Folin-Ciocalteu colorimetric technique was used to measure the total phenolic contents (TPC) in the chemomile and lavender powder. 10 milligrams of standard gallic acid were dissolved in 10 mL of methanol (1 mg/mL) to create the solution. The standard solution was used to create gallic acid solutions in methanol at various strengths (25, 50, 75, and 100 g/mL). A final volume of 10 mL was created by adding 5 mL of 10% Folin-Ciocalteu reagent (FCR) and 4 mL of 7% Na2CO3 to each concentration. The resulting blue liquid was then well mixed and incubated for 30

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min. at 40°C in a water bath. Then, against a blank, the absorbance at 760 nm was measured.

Aluminum chloride colorimetric test was used to assess the total flavonoid content of chemomile and lavender. 4 milligrams of quercetin were dissolved in 1 mL of methanol to create a stock solution (4 mg/mL). To create different concentrations of 0.25 mg/mL, 0.5 mg/mL, 0.75 mg/mL, and 1 mg/mL solutions, this standard solution was serially diluted. Each dosage of quercetin was applied in 1 mL increments to the test tube containing 4 mL of distilled water. The test tube received 0.3 mL of 5% $NaNO_2$ at the same time as well as 0.3 mL of 10% $AlCl_3$ after five minutes. After 6 minutes, 2 mL of 1 M NaOH were added to the mixture. By adding 4.4 mL of the solution right away, the mixture's volume was increased to 10 mL (Singleton et al., 1999).

Interventional Phase

A group of 20 persons took part in this study and divided into 2 groups named controlled Goand experimental G1. Each group comprised 10 participants. A dosage of 2.4 g of each source (chamomile and lavender) was intervened to each group for the period of 8 weeks. A detailed chart of dosage has been given in Table 1

Table 1: The dosage and treatment plan for human trial period

Group	Number of people	Lavender	Chamomile	Dosage	Period
Controlled Group G◦	n=10	-	-	-	8 weeks
Experimental Group G1	n=10	1.2g	1.2g	Total=2.4g	8 weeks

Physical Parameters

Blood pressure (Systolic and Diastolic) of each participant was measured by using the sphygmomanometer.

Biochemical Analysis

The participants were also analyzed for biochemical testing such as cortisol hormone (stress hormone)

Statistical analysis

The significance level of the findings from this study was determined through statistical analysis using the Completely Randomized Design (CRD) and Analysis of Variance (ANOVA) (Tadhani and Subash, 2006).

Results and Discussion

Proximate Analysis of supplements (Lavender and Chamomile)

The findings of proximate analysis depicted that the moisture content was recorded as6.41% and 11.66% in lavender and chamomile herbs respectively. Crude protein was 11.67% and 16.40 % in lavender and chamomile herbs.Crude fats (2.80%), total ash (9.26%), crude fiber (25.33%), and NFE (44.53%) were calculated in Lavender whereas in chamomile, fat (2.51 %), ash (37.39 %), Fiber (16.44 %) and NFE (15.60 %) were recorded respectively. In comparison to previous research, reported by Leite et al., (2022) analyzed the proximate composition of herbs. The outcomes of the study were quite like my study.

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Table 2: Proximate analysis of supplements (Lavender and Chamomile)

Proximal Analysis	Lavender	Chamomile
	Mean ± S.D	Mean ± S.D
Moisture (%)	6.35±0.012	11.38±0.02
Crude Protein (%)	11.42±0.027	16.28±0.02
Crude Ash (%)	9.14±0.015	37.42±0.03
Crude Fat (%)	2.45±0.003	2.42±0.03
Crude Fiber (%)	25.24±0.01	16.28±0.03
NFE (%)	44.45±0.004	15.43±0.014

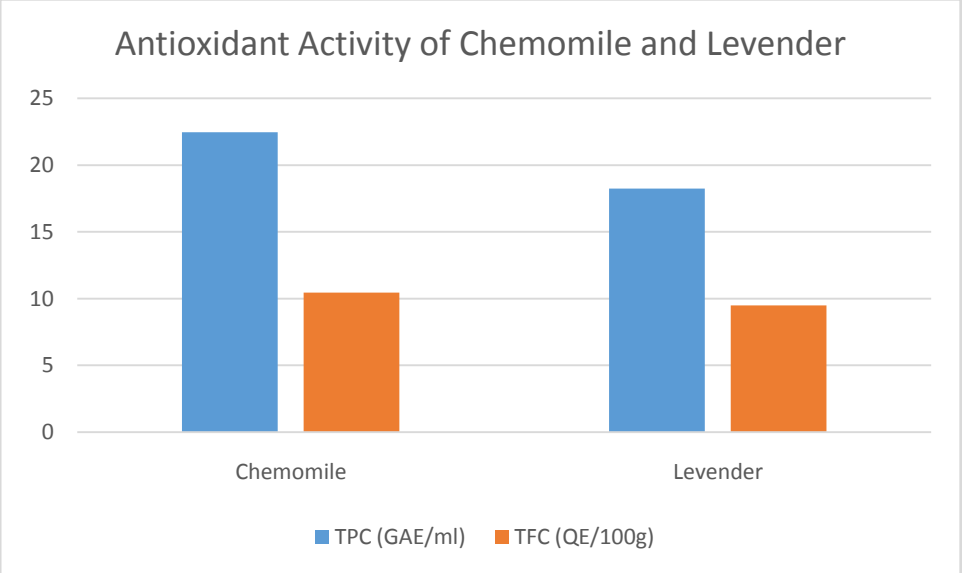
Antioxidant attributes of Lavender and Chamomile

Plants produce secondary metabolites called phenolic chemicals, which include flavonoids and phenolic acids. There is considerable interest in using those ingredients in conventional medicine to cure or prevent cancer because of their capacity to function as antioxidant agents (Heimler et al., 2005).

In vitro antioxidant activity increases with flavonoid or total phenol concentration. The antioxidant activity of E. bulbosa extract demonstrated its potential as a source of natural antioxidants and indicated its certain nutritional value.

Data regarding total phenolic and total flavonoid content of chamomile and lavender is depicted in Fig 1. Bot the product contains a significant amount of TPC and TFC

Fig 1: Antioxidant Activity of Chemomile and Levender



Effect of supplements (Lavender and Chamomile) on cortisol level

Supplements with the proper quantity of Lavender and Chamomile were given for 8 weeks. The activity of every week was kept under observation to check the effect of supplements on Cortisol which is described in Table 3. The findings demonstrated that G0 value in Starting Trial Phase was 8.27±1.526 and G1 value was 7.98±1.822. In end Trial Phase the G0 value was 8.81±1.495 and G1 value was 6.45±1.78. There seemed a significant difference between

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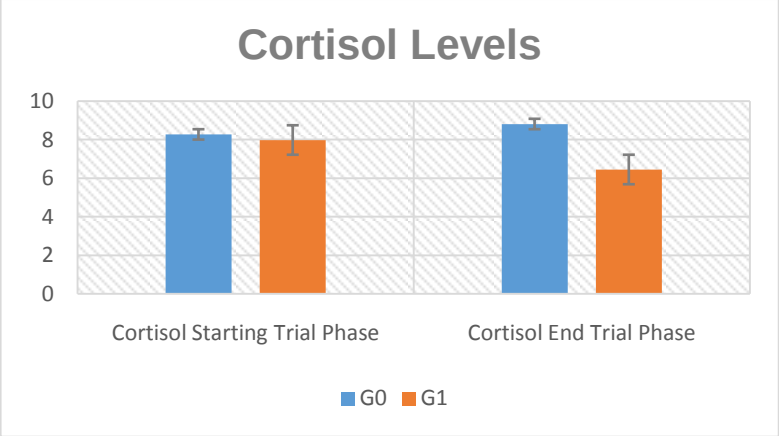
G0 to G1. So, the supplements prepared by lavender and Chamomile have significant impact on Cortisol. From findings, significant decrease was observed ($p< 0.05$). Suyono et al., (2020) reported the somewhat similar results that were matched to our study.

Table 3.Descriptive statistics of Cortisol levels by the consumption of supplements (Lavender and Chamomile)

Groups	Starting Trial Phase	End Trial Phase
G0	8.27±1.526[a]	8.81±1.495[a]
G1	7.98±1.822[ab]	6.45±1.78[b]
Total	8.125±1.64[a]	7.63±2.01[ab]

G0=Controlled Group, G1 = Experimental Group

Fig 2: **Descriptive statistics of Cortisol levels by the consumption of supplements (Lavender and Chamomile)**



Effect of supplements (Lavender and Chamomile) on Blood Pressure (mmHg)

The present study was carried out to assess blood pressure in the patients who are provided with supplements for continuously 8 weeks and kept under observation. Figure 1 illustrated the effect of supplements on blood pressure. At the end of every week, observations were collected and analyzed for concluding the results about the effect of Lavender and Chamomile. Statistically, significant improvement was observed for systolic and diastolic blood pressure level after the intervention of supplements prepared from Lavender and Chamomile as compared to control groups.the interventions showed that systolic blood pressure kept on fluctuate over time (Figure 1A).

Fig 3: Effect of supplements (Lavender and Chamomile) on Diastolic Blood Pressure (mmHg)

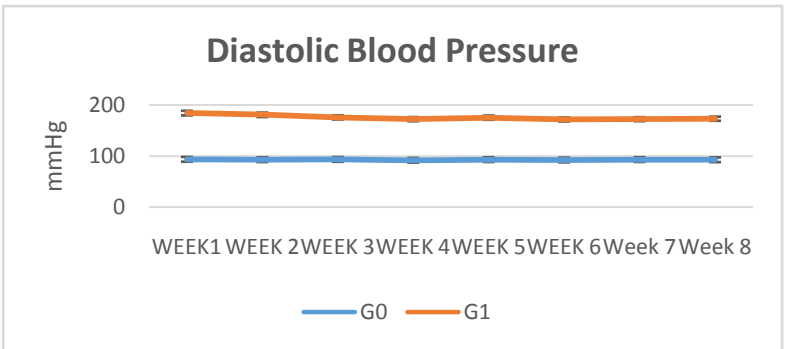


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Table 4: Effect of supplements (Lavender and Chamomile) on Diastolic Blood Pressure (mmHg)

BP Duration (Week Basis)	G0 (mmHg)	G1 (mmHg)
Week 1	93.7± 1.02	90.5± 0.12
Week 2	93±0.45	87.8±1.02
Week 3	93.5± 1.45	82.3±0.05
Week 4	91.8± 0.89	80.5±1.45
Week 5	93.1± 0.45	82.1±1.08
Week 6	92.3± 1.12	79.5±0.99
Week 7	93.2± 0.787	79.1±1.56
Week 8	92.8± 1.02	80.4±1.01

Diastolic blood pressure level observed during the G0 phase was 93.50mmHgand for G1 it was 90.50mmHg during the first week of the treatment plan. Variation was observed during the fourth, fifth, and sixth weeks of the treatment plan during the G0 phase. A huge decrease in diastolic blood pressure level was found in G1(Figure 1B). Similar context of findings was observed in literature reported by Gultom et al., (2016).

Fig 4: Effect of supplements (Lavender and Chamomile) on Systolic Blood Pressure (mmHg)

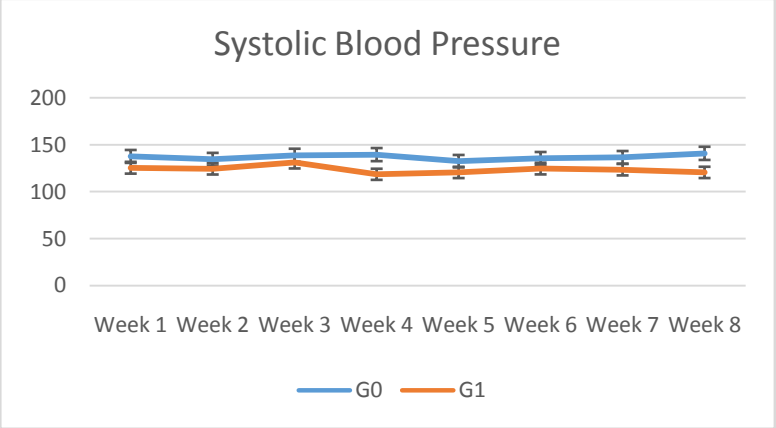

Table 5: Effect of supplements (Lavender and Chamomile) on Diastolic Blood Pressure (mmHg)

BP Duration (Week Basis)	G0 (mmHg)	G1 (mmHg)
Week 1	137.5±0.02	125.45±0.78
Week 2	134.56±0.005	124.45±0.88
Week 3	138.78±1.02	131.24±0.54
Week 4	139.45±0.45	118.45±0.67
Week 5	132.45±0.64	120.45±1.02
Week 6	135.45±0.36	124.57±0.55
Week 7	136.45±0.21	123.45±0.28
Week 8	140.78±0.18	120.48±0.34

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Conclusion

Supplements prepared from lavender and Chamomile have shown positive results Lavender and Chamomile are important herbs that are used for medicinal purposes around the globe. From the findings, we may conclude that supplements prepared from Lavender and Chamomile proved highly effective among patients with raised cortisol level and blood pressure that could be beneficial for maintaining the personality and health status.

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