

THE EFFECTS OF GINSENG ON THE PERFORMANCE OF NURSES ON NIGHT DUTY

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Introduction

Ginseng is the root of the Far Eastern herb *Panax ginseng*. It is used in indigenous medicine as a tonic and restorative. This implies a usage during tiredness, debility and reduced function in both healthy and sick people¹. Laboratory studies have indicated that ginseng has antifatigue properties²⁻⁵, which are associated with its constituent saponins⁶. The action of ginseng on arousal is distinguishable from the excitation produced by classical stimulant drugs both by behavioural⁷ and neurochemical⁸ tests. Fulder as proposed instead that ginseng saponins increase arousal and stamina by altering the brain levels of the psychohormones (especially corticosteroid and ACTH) which are involved in producing psychological readiness during stress¹. There is some evidence for this.^{9,10}

There have been occasional studies on the effect of ginseng on human performance.¹¹⁻¹³ However there is a lack of tightly controlled experiments on the effect of ginseng on human abilities during stress, especially where the stress is that of the normal working environment. Therefore we have carried out a double blind crossover study on the effect of ginseng on performance in subjects fatigued by their working conditions.

Methods

The subjects were student nurses at the Maudsley Hospital, Camberwell, London. For four weeks they are required to work at night. The shift from day to night work is both physically and emotionally draining since it disrupts social and physiological rhythms. The nurses were studied for three days after the switch to night work since this period is the most stressful. Twelve nurses of both sexes were given 1200 mg. of Korean white ginseng root in capsule form or an identical placebo on a double blind, randomised, basis. They took the capsule at 19:30 hrs. and performed their duty. At 09:30 after the third night of work the subjects were assessed. According to the crossover design, each subject was tested on three occasions: after taking ginseng (G), after placebo (P), and after a good night sleep during normal daytime work without taking any medication (S).

The subjects assessed their own degree of competence, efficiency and mood, bodily symptoms, sleep quality and degree of lethargy on linear analogue scales. They noted the hours slept and carried out two simple tasks of psychological performance: a test of tapping rate, and a timed number cancellation test. Blood was analysed for various haematological and biochemical par-

ameters.

Results

Competence and Mood Scales: 16 variables were examined. In 15 cases the nurses rated themselves significantly inferior during night work.

Ginseng significantly improved 9 of the 16 variables compared to placebo. The nurses felt particularly more alert, strong, calm, attentive and quickwitted. Two others were slightly improved, and two, happiness and amicability, were reduced. (See Table 1.)

Bodily Symptoms Scale: The nurses

Table 1. Competence and mood

Variable		Rating on Linear Scale out of 100		
0	100	Normal Daywork(S)	Nightwork/ Placebo(P)	Nightwork/ Ginseng(G)
Alert	Drowsy	42 (28)	61 (22)**	53 (28)**
Calm	Excited	21 (14)	39 (25)**	34 (21)**
Strong	Feeble	43 (30)	66 (23)**	56 (26)**
Muzzy	Clear headed	57 (23)	36 (21)**	37 (23)*
Well coordinated	Clumsy	36 (26)	59 (27)**	57 (25)*
Lethargic	Energetic	51 (25)	33 (24)**	33 (21)
Contented	Discontented	29 (21)	42 (24)**	36 (28)**
Troubled	Tranquil	71 (19)	53 (24)**	64 (19)**
Slow witted	Quick witted	59 (21)	29 (26)**	36 (24)**
Tense	Relaxed	71 (18)	58 (28)**	57 (22)
Attentive	Dreamy	48 (27)	69 (22)**	59 (20)**
Incompetent	Competent	63 (21)	38 (18)**	42 (22)**
Happy	Sad	34 (21)	34 (16)	41 (24)**
Antagonistic	Friendly	59 (24)	60 (25)*	53 (27)**
Interested	Bored	42 (18)	53 (27)**	53 (28)
Withdrawn	Gregarious	54 (19)	41 (18)**	44 (15)**

Scores, with standard deviations in brackets, on self rating analogue scales.

*Significance of 5% **Significance of 1% on a 1-tailed T test, comparing placebo with daywork (after good night sleep) and ginseng.

showed a significant deterioration in 11 of 13 bodily symptoms as a result of night work. There was generally little change with ginseng compared to placebo, with insignificant improvement in the self rating of anxiety, nausea, bowel movement and urination, a significant deterioration in breathing difficulty, and insignificant deterioration in 7 other variables. (See Table 2.) The nurses felt more sexuality after the switch to night work, and ginseng returned the level somewhat towards that of normal work.

Performance Tests: Night work reduced the score on the tapping test by 10% and on the number cancellation test by 15%. Ginseng improved scores on the tapping test by 5% on average. Ginseng tended to restore performance in most of the subjects on the number cancellation test, but because of "outliers" there was no

Table 2. Bodily symptoms

Variable	Rating on Linear Scale out of 100		
	Normal Daywork(S)	Nightwork/ Placebo(P)	Nightwork/ Ginseng (G)
Anxiety	19 (14)	28 (13)**	25 (13)
Sweating	12 (9)	14 (10)	20 (18)*
Shaking	13 (15)	21 (20)**	20 (21)
Palpitations	7 (6)	13 (12)**	15 (17)
Nausea	11 (17)	24 (24)**	22 (28)
Loose bowels	8 (11)	16 (21)**	15 (23)
Urinary disturbance	8 (10)	20 (23)**	16 (21)
Difficulty breathing	9 (13)	9 (10)	17 (22)**
Tension	8 (10)	18 (11)**	22 (20)
Slow	21 (17)	44 (29)**	52 (21)*
Tired	36 (26)	61 (21)**	67 (18)*
Headache	7 (10)	4 (6)**	8 (9)
Agitation	14 (11)	23 (22)**	26 (24)
Sexuality	25 (22)	33 (31)**	28 (19)*

Scores, with standard deviations in brackets on self rating analogue scales.

* Significance of 5% **Significance of 1% on a 1-tailed T test, comparing placebo with daywork and ginseng.

improvement in the mean scores.

Biochemical and Haematological Parameters: There was no change in the haematological parameters (haemoglobin content, white cell count and platelet ESR) after night work with or without ginseng. Nor did ginseng affect urate, cholesterol, triglyceride, dihydrotestosterone or thyroxine levels. However free fatty acids, testosterone and especially blood sugar levels were all increased by night as opposed to day work, and ginseng restored the levels towards that of day work (See Table 3.)

Table 3. Biochemical parameters

Variable	Blood Levels		
	Normal Daywork(S)	Nightwork/ Placebo(P)	Nightwork/ Ginseng (G)
Free Fatty Acids	0.36(0.18)	0.41(0.24)	0.3(0.17)
Testosterone	3.5 (3.39)	3.9(4.05)	3.3(3.4)
Blood sugar	4.5 (0.46)	5.1(0.67)	4.4(0.8)

Values expressed as relative concentrations. Standard Deviation in brackets.

Sleep and Lethargy: The nurses rated their sleep quality during the day some 10% worse with ginseng than placebo. This was supported by sleep times, for on the first day after ginseng administration, they slept an average 1 hour and 12 minutes less than with placebo, while on the second day they slept 30 minutes less. Their reduced sleep may have made them more lethargic. For on the first night of ginseng administration they were significantly less lethargic with ginseng (50%) than placebo (67.3). However on the subsequent two nights of work they felt more lethargic with ginseng (62.9 and 49.3) compared to placebo (53.4 and 44.7) (scores out of 100).

Conclusion

The results clearly demonstrate the detrimental effect of a shift to night work, on mood, competence and capacity, on the level of a range of bodily symptoms, on several metabolic and hormonal parameters, on psychophysical performance and on sleeping ability of our subjects. This confirms that night work is stressful and

exhausting, and it also shows that the experimental procedures used here are able to measure this fatigued state satisfactorily.

Ginseng consistently restored ratings on tests of mood, competence and general performance, even though the subjects did not sleep as much after taking it. There were also improvements in the objective tests of psychophysical performance. Therefore we can confirm that ginseng does have antifatigue and tonic properties in man.

Previous human studies have found larger increases in arousal in the laboratory, or under conditions of considerable stress and exhaustion, for example in athletics. With animal studies, extremes of stress and fatigue can be produced, such as in the mouse swimming test. In these cases the arousal effects of ginseng are stronger. However in this study we have used: a) a mild stress, b) a low dose for only 3 days, c) normal working conditions. This means that our results show the effect of ginseng to be mild. On the other hand, they are more applicable to everyday situations. To the best of our knowledge this is the first well-controlled study demonstrating such tonic effect of ginseng in daily life.

It is interesting that ginseng restored blood sugar levels raised by stress. This has already been noted in the laboratory¹⁴ but not previously in man.

If ginseng increases arousal it would be expected to reduce the amount of sleep, and this is what we found. The deterioration of sleep quality is probably a subjective reflection of the reduced sleep time, and the subsequent increase in lethargy a subjective "hangover" from reduced sleep. The relationship between ginseng and sleep quality should be investigated further as a potential side effect of ginseng self-administration.

Ginseng has psychoactive effects, which may be the result of a modulation of stress-related psychohormones. We would suggest that further studies of ginseng given to people under stress would be of value. It may provide the experimental basis for the administration of ginseng to those in stressful working conditions such as are experi-

enced in industry.

Chairman: Now the time is open to discussion.

Questioner: I should ask a question. Have anyone else noticed any connection between their studies, clinical studies between ginseng administration and sleep? I have not, but I know on the paper that I will present their some remarkable similarities we have done on tests. We have worked with fatigue particularly with regards to the stress events. And I think it would be appropriate for tomorrow. I would like to ask if your population were using stimulants such as coffee, tea whatever you have during the night shift.

Fulder: Yes, they were asked to use the same amount of coffee or tea as they would under normal conditions in other words, not to go excessive any direction.

Questioner: Did you put that out of your experimental results or they were not really put out?

Fulder: No, once put out, they all take on the average one coffee in the morning, one cup of coffee at night. We obviously eliminated any kind of psychoactive medication or the other kind other than caffeinated drinks.

Hu: As we have time. I'm just it's not experiment, just answer to your question. I have some friends who have ginseng and two of them there are very close to have said they couldn't take ginseng because a loss sleep. These people are in their seventies. They take ginseng as Chinese do for elderly people but very fortunate lost their sleep. Now experiment but experience.

Questioner: If we speak about medication, I think then the medicine should be defined. So, my question Dr. Fulder is following: Have you analysed the white ginseng powder and what kind of roots were used? What is the source of your content of the capsules? The experiment designed was to use the kind of ginseng which is readily available in the market in the United Kingdom. And we wanted to use pure ginseng. So, we established the pure whole root six-

year-old white ginseng roots ground and made into the capsules. We didn't establish any chemical analysis in this material.

Questioner: Yeah, but I do not quite agree with you because if we here talk about saponin and glycosides. I think we should find what makes the action of ginseng. We talk about the ginseng symptom. Product, with which the double-blind study is made, should be defined before such a study in even executed.

Fulder: But people in the United Kingdom don't take saponins, they take ginseng.

Questioner: I know that. But we talk about action of the plant, so therefore, I think we should also define what makes the action before I mean cause which action.

Fulder: I agree with you that for theoretical purposes to understand what's going on we need to use pure materials, pure substances but, in clinical trials, you are required to use the kind of preparations humans actually use in order to establish the effect in the normal usage.

Questioner: Yeah, I understand your point but what say is that we have synthetic medicines and we have natural medicines which are being healthy. So, let me know the nature is not working as we want as we do in the chemical industry. So, therefore, I think when such a test is made then I think it is necessary to define what is the content of the capsules composed of.

Fulder: Yes, we would like to do some studies certainly.

Questioner: I should like to remark that I found I sleep a lot especially when I take ginseng and I also met numerous such people found the same thing. What is possibly be simply that if he remove the stress which is causing like a sleep, it can effect health in certain cases? I doubt any medication can remove the stress but we found the effect very clear on sick quality in every subject. I agree, maybe won't me expect very individual thing we found variation but we found every subject is effected.

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