

ORIGINAL ARTICLE

EFFECT OF CHEWING GUM ON COGNITION
AND BEHAVIOURAL ATTRIBUTES

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Background: Chewing gum has multidimensional effects on the body that work in harmony to improve one's abilities. The present study was aimed to focus at the authenticity of the myth that chewing gum reduces stress, elevates mood and increases concentration. **Methodology:** This descriptive cross-sectional survey and observational analytic study was carried at Rawalpindi Medical College, Rawalpindi over a period of 3 weeks. A total of 200 subjects participated in the study. They filled in their demographic details and self-rated their stress levels in various situations. The group was equally divided into a control and a study group. All the participants were subjected to a mental arithmetic test. The participants of the study group were provided with a gum during their examination. A comparison of the marks scored was done. **Results:** Out of the entire group only 13.3% were non-chewers whereas 50% replied that they chewed gum 'sometimes'. Majority of the people felt mild, moderate and severe stress in general, while in college and during examination respectively. A large number of subjects chewed gum for the reason that it makes them feel elated (43.3%). In the mental arithmetic test, the non-chewer group scored more than the chewer group with a highly significant statistical difference ($p=0.001$). **Conclusion:** Chewing gum has no or minimal role in reducing stress. However, as it cherishes ones' mood, it can be chewed to get rid of the acute anxiety states faced during various stressful conditions. Nevertheless, the study strongly denounces the concept that chewing gum enhances ones attention and cognition.

Keywords: chewing gum, stress, cognition, mental performance

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INTRODUCTION

During the current era, we have to perform a number of tasks in a very short span of time. Therefore in this dynamic world of multi-tasking it is quite natural to get stressed out easily and lose focus quickly. A multitude of techniques have been devised over the years in order to amplify one's cognition by various brain exercises, drugs, nutritional supplements, meditations, etc.¹ One such technique also includes a power nap (sleeping for just 15–20 minutes) that has already been incorporated by many multi-national firms to enhance the efficiency of their employees.^{2,3} But one thing that has attracted us recently for its effects on the cognition and behavioural attributes is the chewing gum. Although, a number of studies have shown the vast positive impacts of chewing gum on memory, multi-tasking and mood but it has not received worldwide acceptance.^{4,5} There can be a number of valid reasons for this under-rating that include funding of a number of such studies by the lucrative manufacturers of chewing gum acting as demagogues for the society, creating an impression of biasing. It can also be due to ignorance of general population regarding these studies or it can be a mere lack of evidence provided by various studies.

The studies that support beneficial impacts of chewing gum on health advocate that chewing gum has multidimensional effects on the body that work in

harmony to improve one's abilities. Chewing gum not only increases the blood flow to brain by 25–40% of normal but also increases arousal responses as per EEG records of the gum chewers.^{6,7} This is depicted to increase the focus and concentration at work. Some studies in UK and Germany have also shown the effect of chewing gum in enhancing the memory both short-term as well as long-term.⁸ Apart from increasing one's abilities in cognition, chewing gum is also considered to uplift the mood of its user.^{9,10} As stress is one of the biggest reality of life, many psychologists and psychiatrists consider that the main reason people chew gum is to relieve boredom and tension. This has also been proved in various studies that chewing gum helps ease stress and tension.¹¹ These proposed remedial characteristics of chewing gum have made it quite popular among the armed forces, athletes and even in some schools across the globe, which is secondarily serving as an ambassador or a trendsetter for such practice becoming rampant in the society.¹² This kind of demeanor demands crass correction, both of the social media and the personnel's who preach it, as well as the literature which stands upright in support of it providing it a false shelter.

A number of studies that support the positive effects of chewing gum on physical, psychological and social well-being but many studies have also reported a

dismal effect of chewing gum on mood and cognition whereas there are still other studies that have proposed impaired cognition with gum chewing.¹³⁻¹⁵ These studies have concluded that chewing gum diverts the attention of its user and thus decreases the efficiency. Therefore, we can say that overall results have been variable. Our study is designed to simplify these jargons and to assess the ways chewing gum reforms one's mood and cognition in order to clarify its exact role in affecting the overall health and life of a person. Our research employs 'practical test' instead of self-rating of attention by the subjects in order to find out whether chewing gum has a substantial role in improving or deteriorating concentration in real life situations.

METHODOLOGY

A total of 200 undergraduates of Rawalpindi Medical College participated in the study. The mean age of the subjects was 18.57 ± 0.679 years. Among the subjects, 40% were males and 60% were females. The sample was divided into control group and study group with 100 subjects in each group with an equal gender distribution in each group.

All participants were given a pre-formulated Performa to fill in the details such as demographics and answer open ended questions including the frequency of chewing gum, self-rated levels of stress in general, at college and while taking a professional exam rated as mild, moderate, and severe. After this, each subject in the study group was given a single pellet of chewing gum that was to be chewed for a period of 2 minutes. The two groups were then made to take to a 100 seconds mental arithmetic test adopted from Training and Development Agency for Schools (TDA) sample papers consisting of 10 questions.¹⁶ For each question a total of 10 seconds were given and then the power point presentation slide on the projector in front of all the participants was changed, moving to the next question. The use of any electronic instrument was prohibited during the test. At the end of the test the Performa was collected back for statistical analysis using SPSS.

Each sample question of the mental arithmetic test was given 1 mark with a total of 10 marks for the whole paper. While marking the papers, one score was awarded for each correct answer and 0 score was given for every wrong answer. Afterwards the questions of all the responders in one group were added making a total of 1,000 questions for control and study group each. Similarly the answers of all the responders in one group were added giving us a total of 533 correct answers out of 1,000 in the control group (53.3% correct, 46.7% wrong) and a total of 460 correct answers out of 1,000 in the test group (46.0% correct, 54.0% wrong). Chi-square was used to compute the statistical significance.

RESULTS

The mean age of the control group was 18.60 ± 0.632 years whereas that of the study or chewer group was 18.53 ± 0.743 years with an equal gender distribution. This shows that the participants in this study belonged to the upper teenage group allowing us to target the ones who can benefit most out of this study. Out of the entire lot only 13.3% never chewed gum whereas all other were found to be gum chewers and out of the whole lot 50% replied that they chewed gum 'sometimes' with 'occasionally' and 'very occasionally' responses in this regard tied at 16.7% and 'very often' finishing last with only 3.3%. When analysis regarding stress was conducted, we found that majority of the people felt severe stress during professional examination 33.3%, while in usual college timings only 13.3% experienced severe stress and no one replied 'severely stressed' in general outside the college (Table-1).

Table-1: Stress levels in various situations (%)

Level of Stress	In Professional Exams	At College	In General
None	10	16.7	40.0
Mild	10	33.3	53.3
Moderate	46.7	36.7	6.7
Severe	33.3	13.3	0

Out of the total 50% subjects who replied that they use chewing gum 'sometimes', majority of them felt mildly (53.33%), moderately (46.67%) and severely stressed (53.3%) in general, at college and in professional examinations. One of the other major parts of this study was also to see why people chew gums and out of all the replies we found that 43.3% people chew gum because it makes them feel happy. This self-assessment of mood in gum chewers can be a clue to the fact that chewing gum actually elevates one's mood. Upon asking whether one would chew the gum optionally to increase one's concentration in the examination, 63.3% replied 'no' and those replying 'may be' were 20% of the whole population. However those who were of the opinion that chewing gum enhances concentration during examination were only 16.7% (Table-2).

Table-2: Reasons for chewing gum and its effect on enhancing concentration (%)

Reasons for chewing gum:	
Makes me happier	43.3
Gives me jaw line (reduces facial fat)	2.0
Enhances my concentration	17.0
No reason	37.7
Would you chew gum in examination to enhance concentration?	
Yes	16.7
May be	20.0
No	63.3

The subjects in the control group scored higher as compared to the study group. Chi-square test was employed and $p=0.00109$ was computed that is highly significant (Table-3).

Table-3: 2×2 Frequency table of mental arithmetic test challenge between groups

Group	Correct Answers	Wrong Answers	Total
Case (Chewers)	460	540	1000
Control (non-chewers)	533	467	1000
Total	993	1007	2000

DISCUSSION

Life continues to become more stressful and challenging with our insatiable quest for excellence and perfection increasing at an exponential rate. This has in turn explored a world of new amenities, but on the downstream, it has seriously affected our health with very limited respites. Man hardly has time for physical exercise, relaxation, and enjoyment with dear and near ones. In recent times, being over-burdened and being chronically unable to give vent to one has led man into a vicious trap of his self made aspirations. He is synoptically challenged hither and thither and this led him to improvise multiple ways to let go of the stresses while being in the trap. Hence it has become indispensable to pay heed to means, which would serve the purpose in the most appropriate manner.

Many stress management techniques have been devised to keep the body and brain in synchrony.¹⁻³ Out of these, an interesting technique that has recently come under trials is chewing gum. It is generally thought to be effective in easing off stress, relieving from boredom and making one feel elated.⁹ However, interestingly some researchers are of the opinion that it also accelerates one's cognition as well.⁸ Many physiological processes that are involved in increasing the focus at a task have been shown to be promoted by the use of chewing gum.^{6,7} Another way that has been used by studies to prove this fact is self-rating of attention levels while chewing and not chewing gum in various tasks.^{17,18} We have tried to simplify the things, by employing a practical test to validate this proposition so that the treacherous effects of chewing gum can be unveiled when it comes to reality. Our study revealed that although most people chew gum because it makes them feel delighted and robust after its use, it is not that much effective in keeping the anxiety away in various circumstances. Stress is basically a physiological phenomenon that makes one ready to face various situations that come across in the life in an optimum fashion.¹⁹ It is usually the stressor that defines what level of stress a person will feel.²⁰ As seen in our study, majority of the subjects witness mild stress in daily life, moderately in college and severely in professional examination. If we analyze this trend the other way round, we will come to know that according to our study none of the subjects feels severely stressed in daily life, some feel severely stressed at college but a majority feels severely stressed in professional examinations. Therefore, this proves the fact that stress levels are

affected basically by the stressor responsible for it. As chewing gum has no effect on the stressor in itself, it has no role in allaying the stresses in one's life. However, as mentioned before, most people chew gum to feel happy, it may be used to get rid of an acute anxiety episode that is faced repeatedly in stress situations. It would not be wrong to term that it is no more than one of the defence mechanism humans have created, its role in acute anxiety disorder should be viewed as a spurious relationship between the resolution of the stressor and chewing gum, as well as diverting some of the neurons.

Now coming to the other important aspect of our study that whether chewing gums help increase the focus, attention and concentration while performing tasks that demand these adjectives or not. Our study is unique in this regard as we have used a practical test mimicking a real life situation to validate this quality of chewing gum. As the results depict, the control group that was not chewing gum performed significantly better than the study group. This means that chewing gum does not help to increase the concentration at work rather it affects it negatively i.e. impairs it. Johnson and Miles¹³, and Tucha *et al*¹⁴ found the same results in accordance to the detrimental effects of chewing gum on cognition. But still over and over again the role of chewing gum in refining cognition has been over emphasized and over rated at the same time. This could be possibly because of the interest of chewing gum manufacturing industry in it who may be using medical literature for the sake of their interests and acting as an unprincipled demagogues. It is therefore not advisable to chew gums in a situation that demands focus.

The results of this study reveal that chewing gum diverts the focus and distracts attention of the person possibly because it activates various parts of the brain like motor centre for mastication, gustatory centre, olfactory centre, etc.²¹ This is of prime interest in situations where an escape of focus is beneficial for example, acute anxiety or boredom. Especially it can be helpful in getting rid of acute anxiety that is often encountered in various stress situations. However it is not able to kill stress, as it has no effect on the prime offender, the stressor, but still it can offer a back door from the constant stress due to any particular situation. This kind of relief not only refreshes the mind but also allows it to realign its strategy against coping the stressor.²² But in situations where there is a demand of constant focus, it is not advisable to chew a gum as it diverts away the brain activity to various motor and sensory centres in the cerebrum which could have been used in a more constructive pattern to achieve an academic gain. When we asked subjects whether, they would like to chew the gum while performing their professional examination, majority reported 'no' which is quite understandable keeping in view the distraction it bears. But still, the people who think that it will enhance

one's concentration should give it a second thought. The study reveals no pronounce impact on cognition as far as chewing gum is concerned.

CONCLUSION

Chewing gum has minimal effect on reducing stress possibly because it doesn't affect the prime stressor by any means. Most of the people chew gum as it makes them delighted and feel robust. This effect of the chewing gum can be employed to curtail the state of an acute anxiety. However, the study strongly denounces that chewing gum deviates attention of its user and therefore reduces the maximal efficiency and coherence in the tasks that require sheer concentration and commitment.

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