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ROLE OF DIAZEPAM IN DENTAL ANXIETY AND IT'S RELATION TO SERUM CORTISOL LEVEL BEFORE DENTAL SURGICAL TREATMENT

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ABSTRACT

Introduction: Dental anxiety is still prevalent, despite advances in treatment methods, and it affects the utilization of health does not only decrease the pain threshold, but actually leads to the perception of painless stimuli as painful. Cortisol is an important hormone in the body, secreted by the adrenal glands and involved in many functions.

Aim of the study: To evaluate the relation between the level of serum cortisol and increase anxiety in dental patients before minor oral surgery and role of low dose diazepam in decrease anxiety.

Materials and method: Sixty patients were included in this study were attended Alkatana Specialized Dental Center from December/2011 till March/2012, their age ranged from (16-65 years) 32 patients were females and 28 were males. They were divided into three groups, 30 of them as controls (they didn't need any dental surgery), second group are 20 patients study group in age, sex and their general health status but they needed minor oral surgery, other third group are 10 patients who take low dose diazepam (5mg) before minor oral surgery. Blood samples were collected from all patients between 10-11 Am., and about 5 minutes before surgery to the patients of the study group and third group. Serum cortisol level was measured by using radioimmunoassay analysis.

Results: A total of 60 patients were enrolled in this study. Regarding the control group 15 were females and 15 were males while for the study group patients 12 were females and 8 were males while in third group 5 were females and 5 were males. Serum cortisol level was significantly different between three groups the mean was 13.05 ± 6.51 for control patients and 23.62 ± 10.12 respectively while for valium group 10.3 ± 1.28 and the Coefficient correlation (r) between serum cortisol level and pulse rate in three groups were 0.23 ($p > 0.05$) for the control patients and 0.55 ($p < 0.01$) for the study group patients and 0.42 ($p > 0.05$). When serum cortisol concentrations in study group were distributed according to the age of the sample, there was a highly significant positive correlation between these variables ($r = 0.36$, $p < 0.05$). Also pulse rate in study group was found highly positive association with age ($r = 0.55$, $p < 0.01$). While serum cortisone concentration and pulse rate no significant different in patients who take 5mg diazepam before minor dental surgery.

Conclusions: It is concluded that the valium group patients exhibited significantly low levels of serum cortisol than that of the study and control group. We examined the acute effects of low dose of diazepam 5mg on plasma cortisol concentration in a group of normal healthy patient as part of a study examining the cognitive effects of these medication.

KEYWORDS: Dental anxiety; Pain; Cortisol.

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INTRODUCTION

Dental fear, anxiety and phobia have consistently been reported as widespread problems that persist despite the technological advances that have made dentistry less painful and less uncomfortable. It is well documented that dental fear has a significant impact on dental care utilization behaviors.^{1,2,3}

Dental anxiety is a reaction to an unknown danger. Anxiety is extremely common and most people experience some degree of dental anxiety especially if they're about to have something done which they've never experienced before. Basically it's a fear of the unknown. Administration of various benzodiazepine has been associated with a decrease in basal plasma cortisol and adrenocorticotropin hormone (ACTH) concentrations, consistent with a decrease in hypothalamic-pituitary-adrenal (HPA) axis activity^{4,5}. BZPS have been shown to attenuate or block the increase in plasma cortisol associated with various types of acute stressors, such as preoperative stress, painful electrical stimulation, hypoglycemia, and metabolic stress⁶. There are also little data on tolerance with respect to cortisol during chronic Bzps. Although diazepam produced comparable reductions in plasma cortisol in the two groups, diazepam-related impairments in saccadic eye velocity and short-term memory were found only in Bzp-naïve patients.

It is widely accepted that psychological stress can produce effects in a variety of physiological systems that are similar to those produced by physical challenges due to activation of two stress response systems. These systems are the sympathetic or autonomic system and the hypothalamus-pituitary-adrenal axis⁷. Therefore, the aim of the present study was to investigate the possible relation of dental pain self-reported anxiety and salivary cortisol concentration in emergency dental patients prior to receiving treatment. Prolonged high levels of cortisol can lead to heart disease and other health problems. Treatment for dental fear often includes a combination of behavioral and pharmacological

techniques. Therefore; the aim of the study was to investigate the possible relation of dental pain self-reported anxiety and salivary cortisol concentration in emergency dental patients prior to receiving treatment. We examined the acute effects of low dose of diazepam 5mg on plasma cortisol concentration in a group of normal healthy patients as part of a study examining the cognitive effects of these medications.

MATERIAL AND METHOD

In total 60 subjects enrolled in this study were attended Al-Ramady teaching hospital and Alkatana Specialized Dental Center from December/2011 till March/2012, their age ranged from (16-65). 32 patients were females and 28 patients were males. They were divided into three groups. 30 of them as controls (they didn't need any dental surgery) the other 20 patients study group they needed minor oral surgery. Who match the other 3rd group (Diazepam group) who take small dose of diazepam 5mg at night one day before minor oral dental surgery. Female experimenter measured blood pressure and pulse rate for all patients and then she collected blood samples from them between 10-11 AM, about blood samples were placed immediately in heparinized tubes containing sodium meta bisulfate as antioxidant then centrifuged at 5000 r.p.m. for three minutes.

Plasma samples were immediately pipetted into tubes containing 0.5ml of iced 4N perchloric acid and then frozen. Serum cortisol level was measured by radioimmunoassay analysis using cortisol RIA kit /Iso data 20/20 Gamma center/USA according to manufacture instructions.

For statistical analysis, chi-square tests (χ^2) with Yates correction were used to compare the distribution of subjects in the categorical variables. Data of serum cortisol levels are presented as mean values and standard deviation (SD). Serum cortisol concentrations were log-transformed, which normalized the distribution of cortisol measures.

Student's *t*-tests were used to compare continuous variables. Correlations were explored by means of the person correlations were explored by means of the person correlations coefficient. Correlations involving pulse rat and serum cortisol level were analyzed by means of spearman correlation coefficient Statistical significance was accepted at $P < 0.05$.

RESULTS

A total of 60 patients were enrolled in this study. Regarding the controle group 15 were females and 15 were males while for the study group patients 12 were females and 8 were males further more 5 femal and 5 male in patient who take low dose of diazepam.

Serum cortisole level was significantly different between three groups the mean was 14.28 ± 5.82 for control patients, 23.62 ± 10.12 for study patients and 10.3 ± 1.28 for patient who take low dose diazepam (5mg) before minor oral surgery as shown in figures 1.

And coefficient correlation (*r*) between serum cortisol level and puls rat in three group were 0.23 ($P > 0.05$) for controle patients was not significant while 0.55 ($P < 0.01$) for study group patents there was a highly significant positive correlation between these variables and 0.42 ($P > 0.05$) for patients who take low dose of diazepam (5mg) before minor oral surgery was not significant shown in figures 2,3,4. when serum cortisol concentrations in study group were distributed according the age of sample, there was ahightly significant positive correlation between these variables ($r=0.36$, $P < 0.05$) while serum cortisol concentrations in both controle and diazepam group were distributed according the age of sample their was no significant correlation between these variables ($r=0.28$, $P > 0.05$) ($r=0.15$, $P > 0.05$) in respectively. Also pulse rat in study group was found highly positive association with age ($r=0.55$, $P < 0.01$). While in other two groups was found no significant association with age.

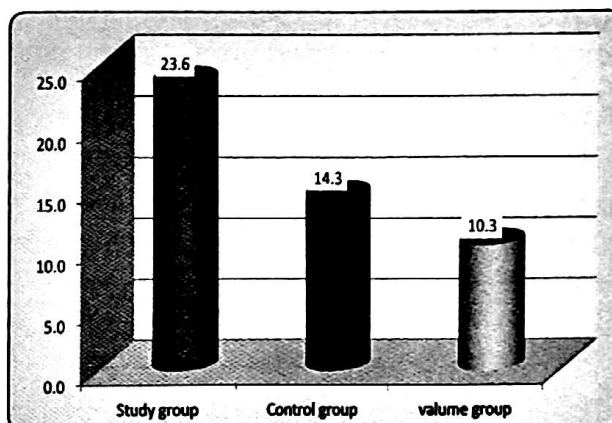


FIG. (1) Shows different in mean of serum cortisol level in three group

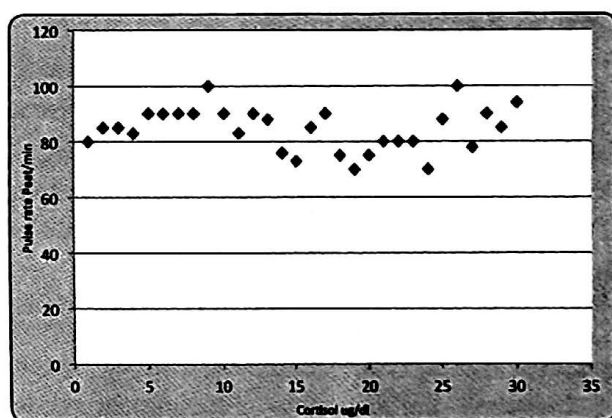


FIG. (2) Shows the relation between pulse rate and serum cortisol level in controle group

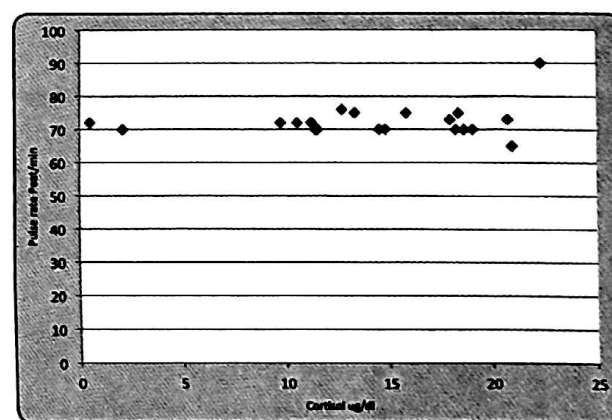


FIG. (3) Shows the relation between pulse rate and serum cortisol level in study group

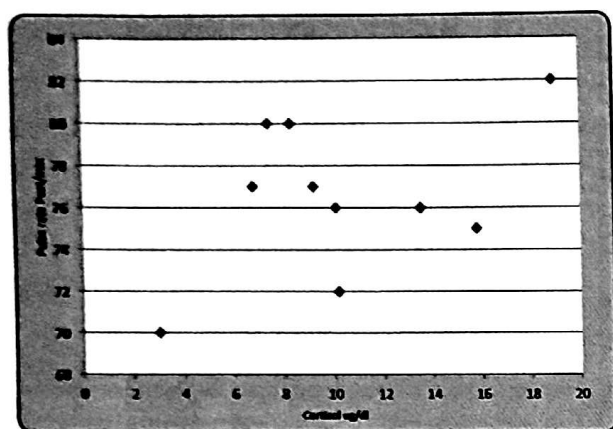


FIG. (4) Shows the relation between pulse rate and serum cortisol level in diazepam group

DISCUSSION

Emergency dental situations involve a high prevalence of fear and anxiety, and it is important for the dentist to be able to recognize such patients. Consistent with previous results, we found that acute administration of diazepam (5mg) resulted in a significant reduction in plasma cortisol.

In present study show dental anxiety or stress increases serum cortisol secretion as a result of increased corticotrophin releasing hormone (CRH) secretion and increase sympathetic tone therefore, cortisol play a role in body response to stress (activation of energy metabolism, increase in cardiac performance). Also cortisol increase myocardial contractility and vasoconstriction these are described as permissive effects of cortisol. Cortisol increases the synthesis of epinephrine in the medulla and angiotensinogen in liver⁽⁹⁾. Normally, cortisol present in the body at higher levels in the morning, and at its lowest at night. Although stress is not the only reason that cortisol is secreted into blood stream, it has been termed in higher levels during the response to stress, and it is responsible for several stress-related changes in the body –cortisol potentiates production of catecholamines and regulates between adrenergic receptors^(10,11,12). People who are dentally fearful tend to avoid treatment are much more likely to

attend the dentist when prompted by pain and their avoidance removes opportunities for learning, as does the dental profession's emphasis on the use of sedation or general anesthesia with fearful patients^(13,14). Although many authors have shown that dental anxiety is more common in women than in men^(15,16,17) in the present study there was no relation between gender and dental anxiety. This was in agreement with findings of Locker *et al*⁽¹⁸⁾. Hakeberg *et al*⁽¹⁹⁾, Humphreys *et al*⁽²⁰⁾ and Milgrom *et al*⁽²¹⁾ reported that younger subjects were more anxious than older ones; however, in the present study dental anxiety was not correlated with age. This may be due to small number of patient's age more than 50 who seek care. Zimmer *et al* and Kirschbaum *et al* demonstrated that the pain is stimulus that results in significant increases of salivary cortisol⁽²²⁾. The present study is in agreement with these studies, in which dental anxiety in study group patients exhibited significantly higher levels of serum cortisol due to phobia from dental surgical work because stress increases serum cortisol secretion and increases sympathetic tone. In present study the low diazepam dose (5mg) had significant effect on reductions in plasma cortisol. This disagrees for instance, Loach and Fisher (1975) reported that 1.5mg of lorazepam attenuated cortisol response to presurgical stress and more recently, Collompehl (1994) reported a similar effect of 2mg lorazepam dose on the cortisol response to exercise. Moreover, the pulse rate in study group was found highly positively associated with age immediately prior to the dental checkup. This is in agreement with Rayen *et al*. The results clearly showed a significant change in the systolic pressure and rate in all the situations in dental operatory area.

CONCLUSION

The occurrence of a traumatic dental experience is important for maintaining of dental anxiety, and knowing how the experience was internalized it can help to provide a more effective treatment so low dose of diazepam (5mg) in this study is effective in decreasing dental anxiety.

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