Effect of Ascorbic Acid and Alprazolam on Behaviour, Skeletal Muscle Activity and Brain Glutamate Levels in Albino Rats

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Ascorbic acid (vitamin C) is a water-soluble vitamin that participates in many oxidation-reduction processes in the body. It has been shown to be involved in various physiological functions including the central nervous system (CNS) and the skeletal muscle activity.

Alprazolam is a benzodiazepine derivative that is commonly used in the treatment of anxiety and phobias. It is also used in the treatment of depression and in some cases, to promote muscle relaxation as well.

The study investigates the effects of Ascorbic acid and Alprazolam on the behavior, skeletal muscle activity, and brain glutamate levels in Albino rats. It was found that Ascorbic acid has an anxiolytic effect, muscle relaxant effect, and may also have an antidopaminergic effect. Alprazolam was found to have an anxiolytic effect without causing muscle relaxation or sedation.

The study concludes that both Ascorbic acid and Alprazolam have therapeutic potential in the treatment of anxiety and related conditions, with Ascorbic acid having additional muscle relaxant properties.
ولم يُؤثر حامض الأسكوربيك على المفعول المضاد للقلق لعقار الألبرازولام عند استعمالهما معاً. فالحيوانات عندما عولجت بحامض الأسكوربيك وعقار الألبرازولام، تأثيراً مضاعفاً. حامض الأسكوربيك لم يتداخل في عمل Alprazolam على الجهاز العصبي المركزي CNS ولم ينشط التأثير المركزي للالبرازولام.

يلاحظ أن تأثير منوم جراء استعمالهما معاً، كما أن المعالجة بحامض الأسكوربيك بالجرعة 125 جم / كيلوجرام مع Alprazolam (2 مج / كيلوجرام) أنتجت إرخاء للعضلات الهيكلية بشكل ملحوظ، هذا فحسب تدخل حامض الأسكوربيك بالآلية synergestic

كما يمكن أن يكون لحامض الأسكوربيك تأثير مقوي على كمرخي للعضلات. ومن ناحية أخرى، أثر حامض أسكوربيك لوحده في مستويات Alprazolam في الدماغ، حيث زاد مستويات glutamate في ذلاك الدماغ والدماغ المتوسط midbrain.

وقد أنقص هذه المستويات في ساق الدماغ وشرة الدماغ brain stem وشرة الدماغ cerebellum مع Ascorbate للاكسوربيت heteroexchange لوحده وانقص بشكل ملحوظ glutamate المستويات Alprazolam لوحده. استعمال عقار الألبرازولام glutamate، انقص هذا المستوى في الدماغ المتوسط midbrain والمستويات glutamate في striatum.

الإرخاء يدعو للفرض بأن التأثير المضاد للقلق الامراضي يدعو للفرض بأن التأثير المضاد للقلق لا يمكن أن يُفسّر فقط بواسطة التفاعل مع أو بتحفيز مستقبلات الجاما GABA على مستويات الجلوتاميت glutamate. ولا يمكن أن يُفسّر فقط بواسطة التفاعل مع أو بتحفيز مستقبلات الجاما GABA على مستويات الجلوتاميت glutamate. Aanxiolytic effect بفسّرها تأثيراً مماثلاً عندما استعملها سوياً.
Abstract
Alprazolam is a benzodiazepine derivative that is currently used in the treatment of generalized anxiety, panic attacks with or without agoraphobia and depression. The physiological functions of ascorbic acid are largely dependent on the oxido-reduction properties. However, A growing body of evidence indicates for ascorbate a very important role in CNS functioning rather than just fulfilling the relatively passive roles of general reducing agent and enzymatic cofactor. Modulation of synaptic events, locomotor activity, intermodulation with the consciousness state, are new fields of ascorbate activity. The role of glutamate in anxiety disorders is becoming more recognized with the belief that drugs that modulate glutamatergic function have the potential to improve the current treatment of these severe and disabling illnesses. Some evidence indicates that glutamate and ascorbate are linked via a carrier-mediated heteroexchange process suggesting that ascorbate may act through the glutamate system to influence behavior. The present study investigates the effects of alprazolam and ascorbic acid alone or in combination on anxiety behavior and on glutamate levels in discrete brain regions of albino rats. The anxiolytic effect was studied using a plus maze model, skeletal muscle activity effect was scored using pull-up test and brain levels of glutamate were measured using high performance liquid chromatography. The results indicate that ascorbic acid has dose dependent anxiolytic and muscle relaxation effect with out sedation; it also increased spontaneous motor activity by increasing total lines and entries into open and closed arms. Ascorbic acid may exert its anxiolytic action by decreasing glutamate release or by increasing GABA binding. Ascorbic acid showed also antidopamnergic effect which may influence behavior. Alprazolam alone at the dose used (2mg/kg) produced anxiolytic effect without sedation or muscle relaxation. The anxiolytic effect of alprazolam was not affected by ascorbic acid administration. Animals treated with ascorbic acid and alprazolam together showed additive anxiolytic effect which was clear with the large dose of ascorbic acid (500 mg/kg). Ascorbic acid does not interfere with alprazolam action on CNS and did not potentiate the central effect of alprazolam, otherwise sedation would be observed. The combination treatment of ascorbic acid in a dose of 125mg/kg or 500mg/kg with alprazolam (anxiolytic dose) produced significant and dose dependent muscle relaxation as the regaining position
time was increased significantly; this may be due to the interference of ascorbic acid and alprazolam with the mechanism of skeletal muscle contraction. Ascorbic acid may have synergistic effect on alprazolam as muscle relaxant. Ascorbic acid alone increased the levels of glutamate in striatum and in mid brain but decreased these levels in brain stem and cerebral cortex which may due to heteroexchange mechanism of ascorbate with glutamate during glutamate uptake. Alprazolam alone increased significantly the level of glutamate in striatum and decreased this level in mid brain, which may provided a newer mechanism and may supposes that the anxiolytic effect of benzodiazepines can not be accounted for only by the interaction at the GABA A benzodiazepine receptor complex. Ascorbic acid did not modify the alprazolam effect in these brain regions but instead showed similar effect when combined together.