



Available online at: www.basra-science-journal.org



ISSN -1817 -2695

In vitro study of the effects of some pediatric tonics and appetizers on the male rabbits intestinal (jejunal) smooth muscle motility

Mustafa A.Hussein, Nawal k.Ibraheem and Ahmed B. Abdalwahid

Department of physiology/ College of Medicine/ University of Basra

Received 5-12-2012 , Accepted 28-7-2013

Abstract

Vitamins and mineral supplements are needed in very small amounts for growth and for maintaining good health. They are especially useful for children who otherwise cannot or will not consume food that is a good vitamin and minerals source. In the present study we try to investigate the effects of three different pediatric tonic syrups (B-plex , Vitamin D₃ and ferosam) and pediatric appetizer cyproheptadine (periactin) (Samara industry. Iraq) (SDI), on mammalian intestinal smooth muscle motility, in an attempt to determine whether these medications can contribute to bowel dysfunction and pediatric constipation.

Segments of jejunum were isolated from rabbit's intestine and submerged in Tyroid's solution which has the same composition of extracellular fluid of the rabbit, they were exposed to different volumes and concentrations of the four medications, and the responses were recorded by a lever which injects ink on a slowly moving drum.

Vitamin B-plex, vitamin D₃ and periactin pediatric syrups induced a dose-dependent inhibitions of spontaneous activity of the jejunum, they induced a significant decrease in the amplitude of jejunal contractions and relaxations(motility), while ferosam syrup shows a significant decrease in the amplitude of jejunal motility at 2ml(36mg) concentration only.

Keywords: vitamin, ferosam, smooth muscle motility, jejunum

1.Introduction

Vitamins and mineral supplements are needed in very small amounts for growth and for maintaining good health [1]. Vitamin B group is a water soluble vitamin which is extremely important for the children to perform its proper functions and for healthy cell metabolism[2]. Initially, vitamin B was considered to be a single vitamin, later on, various studies suggested that vitamin B is actually a group of eight different vitamins that are chemically distinct[3]. While vitamin D which is fat soluble vitamin, it is also one of the most important vitamins required by the body for different purposes, especially for maintaining the health of the child bones and teeth[4]. On the other hand, iron is a mineral that is essential in the production of red blood corpuscles and is often prescribed to treat anemia[5]. Oral vitamins and mineral supplements are especially useful

for children who otherwise cannot consume food that is a good vitamin and mineral source[6]. Cyproheptadine (peractin) syrup which is an antihistamine agent, is used to stimulate appetite in underweight, anemic and children with poor appetite[7]. However, pediatric vitamins, mineral supplements and appetizer syrups are frequently misused and they may be taken as medicine to treat ailments such as common colds[8]. The present study was conducted to investigate the effects of oral pediatric vitamin B-complex, vitamin D₃ and iron syrups together with pediatric appetizer (peractin) syrup on mammalian intestinal smooth muscle motility(contraction and relaxation), in an attempt to determine whether these medications can contribute to bowel dysfunction and pediatric constipation.

2.Materials and Methods

2.1 Drugs

Three different pediatric tonics (vitamin B-plex, vitamin D₃ and Ferosam) syrups with pediatric appetizer syrup (peractin) from (Samara Industry, Iraq)(SDI), were brought from local pharmacy in Basra city(Iraq), and stored at 4C° until the time of experiment. They consist of:

a-Vitamin B-plex syrup, each(5ml) contains:{ vitamin B1(5mg), vitaminB2(2mg) , vitamin B6(1mg) and nicotinamide (20mg)}

b-Vitamin D₃ oral drop, each (10ml) contains vitamin D₃ (45000IU)

c-Ferosam syrup, each(15ml) contains ferrous gluconate (0.4g)

d-Peractin, each (5ml) contains cyproheptadine Hcl (2mg)

2-Animals:

Animals (rabbits) were bought from the local markets. A total of fifteen male rabbits, weighing(1000-1500gm), aged (18-24 months) were used in this experiment. Animals were housed in(3groups) (5 animals in each group) arranged as one control and two treated groups, under a

standard control (free access to food and water), in physiology laboratory of Basra medical college

3-Apparatus and procedure:

Research tissue bath(Harvard) was used ,it contains central vessel of (100ml) size, enclosed within a water jacket which is kept at 37C° by adjustable electric heater. The central vessel is filled with Tyroide's solution. A hollow glass tube ends with a hook that can be lowered to the central vessel. The animals were scarified and the jejunum removed gently and cut off into pieces of about 2cm long and threaded by needle through all the coats near one end from the inside to the outside. The movements of the piece were recorded by ink writing lever on a slowly moving drum. After that (1ml) of vitamin B-plex syrup was added to the central vessel, the effect of this syrup on intestinal contraction and relaxation was recorded by the lever on the drum. Then the central vessel was washed and the piece was removed to start with a new one, and Tyroid's solution was added

with a new specimen (vitamin D₃, ferosam and periactin syrups) in (1ml) and (2ml) respectively, then each result was recorded

on the drum to be compared with control results (contraction and relaxation of mammalian intestinal muscles)[9].

Data Analysis

Data were expressed as mean ± SD, differences between control and test groups were analyzed using SPSS 9 version,

significant effect considered when the P value(≤ 0.05).

Table (1) the effects of some pediatric tonics and appetizers on the male rabbits intestinal (jejunal) smooth muscle motility.

substance	volume	Amplitude of contraction (mm) mean±SD
Distilled water	1ml	12.2± 0.95
	2ml	12.2± 0.95
B. complex	1ml(0.2mg/ml)	4.4±1.12*
	2ml(0.4mg/ml)	2.9±0.99*
(Periactin) Cyproheptadine	1ml(0.8mg/ml)	4.2±1.95*
	2ml(1.6mg/ml)	2.5±1.11*
(Ferosam) Ferrous gluconate	1ml(18mg/ml)	9.8±0.78
	2ml(36mg/ml)	7.3±0.45*
Vitamine D3	1ml(12mg/ml)	7.8±0.22*
	2ml(24mg/ml)	6.8±0.34*

* significant decrease (p≤ 0.05) in (RLSD).

3.Results and Discussion

The segments of the jejunum that submerged in Tyroid's solution which has the same compositions of extracellular fluid of the rabbit, showed a spontaneous rhythmic contraction-relaxation movements of the jejunal smooth muscle after the administration of (1ml) and(2ml) of distilled water and it represents the control amplitude record.

Pediatric vitamin B-complex, vitaminD₃ and periactin syrups induced a dose-dependent inhibitions of the spontaneous rhythmic activity of the jejunum, moreover, they induced a significant decrease(P<0.01) in the amplitude of jejunal contractions and relaxation.

On the contrary, ferosam syrup induced a significant decrease in the amplitude of jejunal spontaneous rhythmic

activity($P < 0.01$) at (2ml) (36mg) concentration only, and does not show any noticeable effect on the spontaneous jejunal activity at (1ml)(18mg) concentration.

Vitamins and minerals aid in certain body processes, but they aren't drugs or miracle cures and if they are not used in a right way, these may not be safe[10]. Pediatric vitamin B-complex, vitamin D₃ syrups together with periactin appetizer syrup show an antispasmodic properties, they significantly decrease the jejunum motility($P < 0.01$) in a dose-dependent manner, that is reversely correlated to their volumes and concentrations.

These findings were supported by the results from previous studies suggested that B vitamins are important in maintaining muscle and nerve cell function and the communication between them, therefore, constipation is a common side effect associated with vitamin B-complex. While other studies suggested that vitamin B-complex is more likely to cause diarrhea than constipation, digestive system responses are different[11,12].

It has been demonstrated that tryptophan amino acid is the precursor of serotonin and it is a potent smooth muscle constrictor[13]. Vitamin B₆ can incite tryptophan metabolism, thus lowering serotonin levels and leads to smooth muscle relaxation[14]. Furthermore, vitamin B₁₂ deficiency where motor and sensory disruption and spasm in smooth muscle of the intestine were present[15]. Regarding vitamin D₃, there are several claims that this vitamin causes constipation because it modulates smooth muscle contractile functions and tone by reducing calcium influx into the endothelial cells and hence decreasing the production of endothelium-derived contracting factors and leads to

smooth muscle relaxation[16]. As a aforementioned, vitamin D₃ is essential for calcium absorption in the body and the excess calcium in the body can lead to side effects like drowsiness and constipation[17].

On the other hand, periactin appetizer syrup acts as a 5-hydroxy tryptamine receptor antagonist, block calcium channels and it also has an anti cholinergic activity, all these effects can cause smooth muscle relaxation[18]. Therefore, constipation is a common side effect that associated with periactin administration[19].

Moreover, ferosam syrup shows a significant decrease in jejunal motility at(2ml)(36mg) concentration only. Studies are being done and determine that the absorption of iron from intestinal tract is affected by several factors, when the body is unable to absorb all of iron from digestive tract, it will excrete more of it through the stool[20]. This changes the color of stool and making it blacker and reduces the amount of water the stool can retain[21]. With reduction of the amount of water this may lead to constipation. The origin of the link between iron fortified formula and constipation is difficult to find. Presumably, the assumption was made that any amount of iron could cause constipation including any that might be found in formula, this is an understandable misunderstanding[22]. In conclusion, this study shows an antispasmodic effects of pediatric vitamin B-complex, vitamin D₃ syrups and periactin appetizer syrup on the jejunal motility and in a dose-dependent manner that is reversely correlated to their volumes and concentrations. While pediatric ferosam syrup shows this effect at (2ml)(36mg) concentration only

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دراسة مختبرية لتأثير بعض الفيتامينات وفتح الشهية المستخدمه للأطفال على حركة العضلات الملساء لأمعاء ذكور الأرنب

مصطفى عبد المجيد حسين نوال خليل إبراهيم احمد بدر عبد الواحد
فرع الفلسفه/ كلية الطب/ جامعة البصرة

الخلاصة:

هناك حاجة إلى الفيتامينات والمكملات المعدنية بكميات صغيرة جدا للنمو والحفاظ على صحة جيدة، فهي مفيدة خاصة للأطفال الذين لا يستطيعون استهلاك المواد الغذائية التي تكون جيدة ومصدرا للفيتامينات والمعادن. في هذه الدراسة حاولنا دراسة تأثير بعض شرابا ت الفيتامينات وفتح الشهية المستخدمة للأطفال على تقلص العضلات الملساء لأمعاء الأرنب وانبساطها ، في محاوله لاكتشاف مدى إسهامها في الاختلال الوظيفي للأمعاء والإمساك. تم اخذ قطع من المعي المعزولة فصلت من أمعاء الأرنب و غمرت في محلول التايروود الذي يحتوى على نفس مكونات السائل الخلوي من جسم الأرنب، وتم إضافة أحجام وتراكيز مختلفة من شراب(فيتامين بى المركب، فيتامين د ، شراب الفيروسام مع شراب البرياكتين المشهي) (شركة سامراء للأدوية) المستخدمة للأطفال و تسجيل استجابة العضلات الملساء لأمعاء بوساطة جهاز حوض الأعضاء المعزولة. أدى كل من شراب فيتامين بى المركب ، فيتامين د مع شراب البرياكتين المشهي إلى كبح التقلصات التلقائية لعضلات الأمعاء بشكل يتناسب مع حجم الشراب وتركيزه بينما اظهر شراب الفيروسام هذا التأثير فقط بتركيز (36ملغم/مل) .