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Painfulness of needle and jet injection in children with diabetes mellitus

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Abstract The aim of this study was to investigate whether insulin application by jet injector is less painful than by needle. Pain was scored by 41 diabetic and seven healthy volunteers after injections with both methods. Injections by jet were no less painful than those by needle but produced several local side-effects.

Key words Children · Diabetes
Insulin · Jet injection · Pain

Introduction

Treatment of diabetic children with diet, self-control and insulin injections is a heavy burden for the whole family. Pain, fear and dislike of needles cause additional stress. Since this may lead to diminished acceptance of intensified insulin treatment in children, a less painful way of insulin application is desirable. Jet injectors have been used for mass immunisation for many years and similar devices for insulin administration have been available for about 30 years. Although several studies describe them as less painful, they are not commonly used in diabetes [1]. The aim of our study was to investigate whether insulin application by a jet injector is less painful for children and adolescents.

Patients and methods

During a 4-week period we consecutively recruited young patients attending our outpatient clinic. A total of 41 patients and their parents agreed to our study protocol. They were 23 males and 18 females aged from 9.3 to 21.1 years with a median age of 14.45 years and a mean body mass index of 19.74. The median duration of disease was 7.0 years (range 0–18). The daily number of injections ranged from two up to seven. Twenty-nine subjects normally used pen injectors and twelf syringe and needle. Twenty-seven of the patients complained about painful injections during their usual therapy. In addition eight healthy volunteers, one male and seven females, median age 28.34 years (range 22.6–44.8), mean body mass index 22.11 took part in this study.

For injections we used 1-ml Plastipak Microfine 4 syringes (Becton-Dickinson) and Vitajet II U 40 (spring powered, Amex). A volume of 0.9% NaCl corresponding to 10 IU insulin, was given in the thighs of the sitting volunteer by a doctor by syringe and jet injector. Immediately after each injection the volunteer scored pain on a 139 mm scale. Local reactions of the injection were noticed. For statistical analysis Wilcoxon Scores, Wilcoxon 2 Sample test and Kruskal Wallis test were used.

Results

The calculated mean pain scores for different defined groups are shown in Fig. 1. Except for patients using needle and syringes all subgroups scored higher for injections by Vitajet than by needle, although the differences were not significant. Vitajet produced lesions on injection sites in 25 (61%) of the diabetic children: bleeding in 21, leakage in 11, painful infiltrate in 4, wheal in 3, and haematoma and delayed pain in 2 cases.

Discussion

Compared to previous studies [4–6] we found that jet injections are no less painful than subcutaneous injections by needle. Local side-effects occurred in more than half of the children and this observation is in accordance with previous experience in adults [1, 4, 6]. Studies on insulin absorption and metabolic control gave inconsistent re-

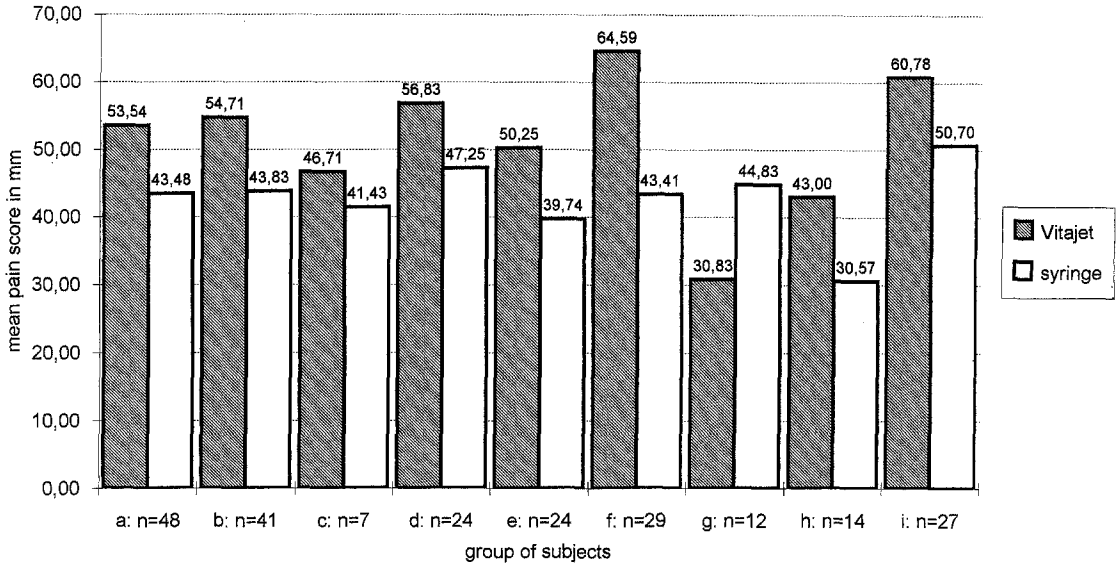

Fig. 1 Mean pain scores for different defined groups determined for Vitajet and syringe injections. (*a* all subjects, *b* diabetic subjects, *c* healthy subjects, *d* all female, *e* all male, *f* diabetic children normally using pen injectors, *g* diabetic children normally using syringes, *h* diabetic children without complaints, *i* diabetic children complaining about painful injections)

sults. More rapid increase and disappearance in plasma free insulin have been reported after jet injection [2, 3], possibly decreasing postprandial hyperglycaemia [2, 3] and late hypoglycaemia [3]. Shorter duration of action of intermediate-acting insulin may, however, lead to hyperglycaemia before the next injection [2, 6]. The only study on jet injectors in diabetic children could not demonstrate an improvement of metabolic control; six patients even presented periods of ketonuria [4]. In summary, our study showed that Vitajet injections were no less painful than needles and were associated with considerable local side-effects. There seems to be no advantage in using this device in the treatment of diabetic children.

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