

## Clinical implication of gluten free cupcakes on anthropometric indices and gastrointestinal symptoms in celiac patients

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Fundamental adherence to conventional gluten free diet can improve gastrointestinal symptoms secondary to celiac disease but also increases the chances of various nutritional deficiencies. The substitution of wheat should be done in such a way that it would not only fulfill the gluten free criteria but it should also provide nutrient density. Therefore, the present study was conducted to assess the efficacy of novel gluten free cupcakes (enriched with chickpea, almonds, flaxseed and sorghum) against gastrointestinal symptoms. Efficacy trial (No.029/IRC/BMR) of gluten free cupcakes for 12 weeks was carried out in children between the age of 3-8 years recruited from nutrition clinic and divided into two groups i.e. control group and treatment group with 35 participants in each group. The treatment group was provided with gluten free flour blend (chickpea, sorghum, almonds and flaxseed) cupcakes on the other hand control group was provided with rice made cupcakes (conventional gluten free recipe). The weight of the cupcakes per unit was 35 g and 2 cupcakes were recommended for consumption on daily basis. The study parameters including anthropometric measurements, caloric intake and gastrointestinal complaints were assessed. ANOVA was applied to assess the difference in parameters. Weight was significantly increased after the 12 weeks trial in both control ( $13.7 \pm 4.8$  to  $14.5 \pm 4.4$ ) and treatment ( $13.6 \pm 4.6$  to  $15.4 \pm 4.6$ ) groups. Mid Upper Arm Circumference (MUAC) was significantly increased in treatment group only ( $15.3 \pm 3$  to  $15.5 \pm 3$ ). Abdominal pain was reduced upto 38.7% from 6.5% (absent) in control group compared to treatment group in which it was reduced from 15.2% to 33.3% (absent). Severe abdominal pain was reduced from 22.6% to 9.7% and in treatment group it was reduced from 24.2% to 18.2% only. Heart burn was reduced up to 29% from 19.4% in control group and in treatment group it was reduced up to 45.5% from 30.3%. Regurgitation was reduced up to 35.5% from 29% in control group and in treatment group it was reduced up to 60.6% from 39.4%. Nausea decreased up to 57.6% from 63.6% but the relation was opposite in case of control group. Diarrhea was reduced up to 33.3% from 27.3% in treatment group. But the cases of moderate to severe diarrhea increased in control group. Formulated gluten free cupcakes are found to be effective in improving anthropometry and gastrointestinal symptoms in study population.

**Keywords:** Gluten free, Cupcakes, Children, Anthropometry, GI symptoms.