INTRODUCTION:
As one of the important foot functions is normal gait, medial longitudinal arch (MLA) play spring-like action far braking and accelerating of movement. The MLA stiffens the foot under loading, enabling it to function as a propulsive lever during walking and running [1]. Previous study showed high-arched feet as rigid and low-arched feet as hypermobile [2]. However arch deformation due to growth and development have not been clarified. The purpose of this study was to clarify medial longitudinal arch deformation during gait in elementary school girls.

METHODS:
Ground reaction force (GRF), MLA angle and height of 45 female elementary school girls (first-grade 21, sixth-grade 24) at preferred speed were investigated with a highspeed camera (GC-LJ20B, JVC inc. 240fps) and an Emed q-100 pedography platform (Novel GmbH, Emed inc. 100Hz). We placed markers on the medial aspect of the first metatarsal head, the navicular tuberosity, and the medial aspect of the posterior calcaneus. We digitized marker position in videos of the medial foot in Frame-Dias V (DKH inc.). To reduce signal artifacts caused by digitizing error, we filtered the raw marker coordinate data using a fourth order low-pass Butterworth filter with a 30 Hz cut off frequency. MLA angle was calculated as the angle between the first metatarsal head, the navicular tuberosity and the medial calcaneus in the local sagittal plane. LA height was calculated as the perpendicular distance between the navicular tuberosity and a line bisecting the first metatarsal head and medial calcaneus.

RESULTS:
Stance time was first-grade 0.55±0.03sec, sixth grade 0.58±0.05sec. Most GRF occurred at the beginning and end of stance phase. MLA height decreased from heel contact and increased after heel rise to its maximum, on the other hand MLA angle increased from heel contact and decreased after heel rise to its maximum at toe-off. No difference was observed between both groups.

CONCLUSION:
Large deformation in MLA was observed around 75% stance phase, where maximum GRF in forefoot was indicated. This tendency was similar in both first and sixth grade elementary school girls.

REFERENCE: