Purpose: Tsukioka Onsen is the prominent hot spring which contains the largest amounts of sulfur in Japan. The purpose of this study is to clarify the benefits of bathing in Tsukioka Onsen by comparison between the bathing in Tsukioka hot spring and with natural water.

Methods: Subjects were 20 females aged from 30 to 60 y.o. On 21th of November, we applied them to bathe in Tsukioka hot spring for 10 minutes (42 celcius) and to bathe in natural water for 10 minutes (42 celcius) using cross-over methods. The interval of the two way bathing was 2 hours. We conducted a questionnaire survey using visual analog scale in which participants answered their subjective health and the sensory evaluation of skin with hot water. Statistical analysis was performed using paired t-test. This research was approved by ethical committee of the Japan health & research institute.

Results: Warming effect of full body, blood circulation, stiff shoulder and back pain were all improved after bathing either with hot spring and natural water. The effects were particularly stronger with hot spring than natural water. Recovery from fatigue, sense of relaxation, sense of refresh, most feeling of skin, refreshing touch of skin were improved only after bathing with hot spring.

Regarding to sensory evaluation of skin, smooth feeling and moist feeling of skin were significantly notified predominantly with hot spring not with natural water.

Conclusion: This study showed that bathing in Tsukioka Onsen may cause thermal, cleaning, and moisture effects more than the one with natural water. We think that the alkalinity and the rich containing of chloride in hot water in Tukioka Onsen may contribute to these effects. We also suggested that one reason for these effects is that the large amounts of containing sulfur in Tukioka hot spring penetrated through skin may cause particular dilation of blood vessels in addition to the thermal effect of hot water.

Keywords: Hot spring, S, NaCl, Circulation