4600 shock waves may be attempted before seeking other types of treatment (i. e., percutaneous nephrolithotomy). Even though the results of this study have identified both stone density and size as significant contributors to ESWL treatment success rate, it also revealed that stone density is the determinant factor of treatment success for stone sizes of 20 mm or smaller.

To date, few clinical studies have compared the stone density with the outcome of ESWL *in vivo*. In a study of 65 patients, Joseph et al [(2)] showed that stones with densities less than 500 HU have 94% clearance rate and required a median of 2800 shockwaves, patients with stone densities of 500-1000 HU have 76% clearance rate and required a median of 3700 shockwaves, and patients with stone densities more than 1000 HU have 42% clearance rate and required a median of 7800 shockwaves.

Pareek et al [(24)] correlated calculus density with stone clearance in their study of 100 patients. They concluded that patients with residual calculi had a mean calculus density of more than 900 HU. However; Pareek et al [(24)] did not correlate the calculus density with fragmentation. The results of our study concurs with Pareek et al results in that stone clearance is unlikely when stone density exceeds 900 HU

The results of this study supports those of Joseph et al [(2)] in that stone density has an inverse relation with the ESWL success rate, and CT stone density has a positive correlation with the number of shockwaves needed for fragmentation. Also, the results of this study concurs with the results of previous studies [(25-27)] in that stone location has a significant effect on fragmentation success and clearance with lower calyceal stones have less success rates compared to other locations.

This study has some limitations including the limited number of the patients; therefore, larger number of patients is needed to achieve more significant results in the future studies. The other parameter was the study of stone chemical composition which can be predicted by measuring the density of urinary calculi using the dual–energy multidetector CT scan. This parameter was not assessed in our study because such types of CT scan are not yet widely available.

In this study, we recommend using non contrast CT (NCCT) scan as an initial diagnostic test to evaluate acute flank pain. Also it can be used to assess urinary stones prior to ESWL especially in patients with recurrent urinary stones as it is helpful to determine stone size and location and more importantly, stone density. This is valuable to choose the appropriate treatment option and to predict the success of ESWL to avoid unnecessary nonproductive ESWL.

In conclusion, ESWL treatment outcome is strongly, but inversely, dependent on stone density. Stones with CT densities of 700 HU or less undergo successful treatment requiring lesser number of shock waves and sessions, contrary to stones with CT densities more than 900 HU Large stones more than 2 cm and stones with lower calyceal location are resistant to ESWL.

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