Check for updates

OPEN ACCESS

DOI: 10.46903/gjms/18.02.847

ORIGINAL ARTICLE

DEMOGRAPHIC AND CLINICAL PROFILE OF ADULT PATIENTS WITH SCAPHOID FRACTURES IN POPULATION OF DISTRICT D.I.KHAN, PAKISTAN

Muhammad Shafiq Khan[1], Nusrat Rasheed[2], Khadim Hussain[1], Muhammad Zubair Farooq[1]

Departments of Orthopedics, [1]Gomal Medical College. D.I.Khan, [2]Dow International Medical College, Karachi, Pakistan

ABSTRACT

Background: Scaphoid fractures are common and account for 60-70 % of all carpal fractures. The objectives of this study were to determine the demographic and clinical profiles of adult patients with scaphoid fractures in population of District D.I.Khan, Pakistan.

Materials & Methods: This cross-sectional study was conducted in Department of Orthopedics, Gomal Medical College, D.I.Khan, Pakistan from January 2015 to December 2019. Sample size was 40. Demographic variables were sex, age groups and time to presentation in weeks. Research variables were; cause, laterality, site, management options, time to union in months and presence of infection. All variables were categorical and analyzed by count and percentages for sample and as CI at 80% CL for proportion for population using Wilson score for binomial distribution.

Results: Forty patients included 34 (85%) men & 16 (15%) women, 24 (60%) in 17-30 and 16 (40%) in age group 31-50 years. Time to presentation was ≤1 week of injury in 19 (47.5%) patients and 21 (52.5%) presented later. Cause was fall on out-stretched hand in 27 (67.5%) and RTA in 13 (32.5%) patients. Right hand was involved in 29 (72.5%), left in 9 (22.5%) while bilateral in 2 (5%) patients. Site of fracture was waist in 24 (60%), proximal pole 11 (27.5%) and distal pole 5 (12.5%) cases. Conservative treatment was done in 7 (17.50%) patients, percutaneous screw fixation 7 (17.50%), open reduction and internal fixation through palmar in 11 (27.50%) and though dorsal 15 (37.50%) cases. Time to union was ≤3 in 7 (17.50%), >3-6 months 29 (72.5%), while >6 months in 4 (10%) patients. Presence of infection was 1/40 (2.38%).

Conclusion: Scaphoid fractures are more common in men and younger adults and most are presented within a week of injury. These are caused mostly by fall on outstretched hand, involving right hand and involving waist. Substantial number of cases requires open reduction with internal fixation. Mostly unite in 3-6 months.

KEY WORDS: Scaphoid Fractures; Adult; Sex; Demographic; Population; Conservative Treatment; Infection; Surgical Site Infection.

Cite as: Khan MS, Rasheed N, Hussain K, Farooq MZ. Demographic and clinical profile of adult patients with scaphoid fractures in population of District D.I.Khan, Pakistan. Gomal J Med Sci 2020 Apr-Jun; 18 (2):75-80. http://doi.org/10.46903/gjms/18.02.847

1. INTRODUCTION:

1.1 Background: There are eight carpal bones, arranged in two rows. Scaphoid spans both rows and articulates with four of the remaining carpal bones.[1-3] Scaphoid fractures are more common than all other carpal bones and account for 60-70% of all carpal fractures.[4-5] In a study by Reigstad, et al., 2,000 patients suffer from scaphoid fracture annually in Norway.[6]

Brøndum, et al.[7] and Larsen, et al.[8] in municipality of Odense, Denmark found 8 females and 38 males with scaphoid fractures per 100,000 population annually. In a span of 8 year they found 273 cases of scaphoid fracture in a population at risk of 175,000, which included 222 (81.32%) men and 51 (18.68%) women. The cause was fall in 69% cases.

Garala, et al.[9] explored 415 cases of scaphoid fractures in UK from Jan. 2010 to May 2013, including 365 (87.95%) men and 50 (12.05%) women. The highest incidence was for males aging 15-19 years.

In a study by Van Tassel, et al.[10] incidence of

Corresponding Author:

Dr. Muhammad Shafiq Khan
Assistant Professor, Department of Orthopedics
Gomal Medical College, D.I.Khan, Pakistan
E-mail: drshafiqorthosurg@gmail.com

Date Submitted: 01-02-2020
Date Revised: 22-05-2020
Date Accepted: 02-06-2020

scaphoid fractures was 1.47 fractures per 100,000 person-years in US population for the period from 2002-2006 (95% CI, 1.31-1.63). In a study by Feehan, et al.[11] annual incidence of hand fracture was 36 per 10,000 with 29 per 10,000 in >20 years and 61 per 10,000 in ≤ 20 years in British Columbia, Canada from May 1, 1996 to April 20, 2001.

Scaphoid fractures usually results from low energy injuries, that is fall on outstretched hand or sport's events. Undisplaced fractures may not be visible on plain x-rays and in high suspicion cases initial cast for two weeks may be applied.[12]

Scaphoid fractures are classified in three ways: 1. anatomical location (proximal pole, waist and distal pole), 2. line of fracture (oblique or transverse), 3. stability of fracture (stable and unstable). Waist fractures are more common and comprise 60-80 % of all scaphoid fractures. Proximal pole fractures are almost one third and are notorious for nonunion. Distal pole fractures are least common.[13]

The blood supply of scaphoid is from radial artery and is in a retrograde fashion, that's why the proximal pole fractures are more prone to be avascular. Therefore proximal pole fractures should be primarily fixed to avoid nonunion.[1,14,15]

Non or minimally displaced waist scaphoid fractures are given six week cast. Screw fixation compared with cast treatment does not reduce time to fracture union.[15]

Diagnostic imaging for scaphoid fractures include radiographs, computed tomography and magnetic resonance imaging. Plain radiographs include five views like; 1. anteroposterior view, 2. lateral view, 3. scaphoid view, 4. oblique view and 5. clenched pencil view. Scaphoid is not visible on initial radiographs in about 25% patients.[16] Magnetic resonance imaging (MRI) has specificity of 90% and sensitivity of 90-100% in scaphoid fractures within 24 hours of injury. Computed tomography (CT) has sensitivity of 92% and specificity of 92-95% and especially helpful in addressing scaphoid nonunion and evaluating healing after scaphoid surgery.[17]

Treatment of scaphoid fractures depends on site, fracture-displacement, time since injury, patient activity level and associated injuries. Undisplaced waist fracture in elderly patient without other injuries is usually treated conservatively in cast for 10-14 weeks.[18] Proximal pole fractures, more than 1 mm displaced fractures, especially in young athletes need surgical intervention.[19] Closed reduction and percutaneous fixation with different types of cannulated screws under fluoroscope is nowadays gaining popularity because it shortens the time to union and convalescence.[20] Anyhow, chronic waist fractures may need open reduction and bone grafting along with stable fixation for early range of motion. Even small sized distal pole fractures which are neglected and symptomatic can be excised.[21] As far as approach is concerned, proximal pole needs dorsal approach, while waist fractures need volar/ palmar approach.

Scaphoid fractures usually need long follow up, till union is achieved or treatment strategy is revised. Radiographs are taken at periodic times and evaluated for union or any complications. Also hand and fingers range of motion are accordingly started from the very start to obtain maximum function at the earliest and to decrease complications.[22]

In a study on 45 patients by Noaman, et al.[23] in 2011, the affected side was the right side (dominant hand) in 32 patients whereas 13 patients had fracture of the nondominant left side. Cause was RTA in 23 patients, fall on outstretched hand in 15 patients and sport injuries in 7 patients.

1.2 Objectives: The objectives of this study were to determine the demographic and clinical profiles of adult patients with scaphoid fractures in population of district D.I.Khan, Pakistan.

2. MATERIAL AND METHODS

2.1 Design, Setting & Duration and Sampling: This descriptive cross-sectional study was conducted in the Department of Orthopedics, Gomal Medical College, D.I.Khan, Pakistan from January 2015 to December 2019. Sample size was 40 patients with 42 fractures, selected through consecutive technique. One hand each was excluded in two bilateral cases to have same size for patients and hands. All adults (17-50 years) patients with scaphoid fractures were eligible for inclusion in the study. Scaphoid fractures of duration more than one year, open or associated with other injuries were excluded from the study. Sample data was collected from Orthopedic Unit, DHQ Teaching Hospital, D.I.Khan, Pakistan.

2.2 Conduct of Procedure: After detailed history and thorough examination, x-ray in three planes were taken; anteroposterior, lateral and scaphoid views. Fractures were classified according to site and treatment was planned accordingly. Treatment categorizations were done according to standard routines. Undisplaced and fresh fractures in non-dominant hand of less active patients were treated conservatively using closed management with casting for 2-3 months. Percutaneous screw fixation was done for fresh fractures of less than two weeks duration, mostly in athletes. Open reduction and internal fixation either through palmar or dorsal approach was opted for fractures older than two weeks. Patients who presented late and having displaced waist fractures were operated from volar side with stable screw fixation and bone grafting. Proximal pole fractures are more easily approached through dorsum. Stable fixation for early active motion and early return to work should be the aim in treatment regimens.

In surgical cases general anesthesia, pneumatic

tourniquet and antibiotic protocol was undertaken as recommended in routine. Follow-up was done weekly for first month, then fortnightly for next two months and monthly afterward till fracture union was achieved. At each visit, radiographs were taken to see for the fracture union and also for any complications.

2.3 Data Collection & Analysis Plan: There were three demographic variables (attributes); sex (men & women), age groups (17-30 & 31-50 years) and time to presentation in weeks (≤1, >1-4, >4-12, >12-24 & >24). There were six research variables (attributes); cause (fall on out-stretched hand & RTA), laterality (right, left & bilateral), site (waist, proximal pole & distal pole), management options (closed management with casting, percutaneous screw fixation, open reduction and internal fixation through palmar approach & open reduction and internal fixation with dorsal approach), time to union in months (0-3, >3-4, >4-5, >5-6 & >6) and presence of surgical site infection (yes & no). All variables were categorical and were analyzed by count and percentages for the sample and as CI at 80% CL for proportion for the population using Wilson score for binomial distribution through an online statistical calculator (Statistic Kingdome).[24]

3. RESULTS

3.1 Demographic Profile: In 40 patients of scaphoid fractures, the prevalence in men (80%CI 76.40-90.84) was higher than women (80%CI 09.15-23.06), similar in age group 17-30 (80%CI 49.87-69.34) and 31-50 years (80%CI 30.66-50.13). The prevalence of time to presentation was similar in ≤ 1 week and > 1-4 weeks groups. It was also similar in the other three groups i.e. > 4-12, >12-24 and > 24 weeks. However it was higher for the first two groups individually than the last three groups individually. (Table 3.1)

Table 3.1: Demographic profile of adult patients with scaphoid fractures in population of District D.I.Khan, Pakistan (n=40)

Variable	Attributes	Sample statistics		80% CI of proportion	
		Frequency	Percentage	Lower	Upper
Sex	Men	34	85.00	76.40	90.84
	Women	06	15.00	09.15	23.06
Age groups (years)	17-30	24	60.00	49.87	69.34
	31-50	16	40.00	30.66	50.13
Time to presentation (weeks)	≤1	19	47.50	37.68	57.52
	>1-4	12	30.00	21.65	39.92
	>4-12	05	12.50	07.24	20.71
	>12-24	03	07.50	03.68	14.67
	>24 weeks	01	02.50	00.75	07.99
Total		40	100%	Population parameters	

Table 3.2: Clinical profile by cause, laterality and site of fracture in adult patients with scaphoid fractures in population of District D.I.Khan, Pakistan (n=40)

Variable	Attributes	Sample statistics		80% CI of proportion	
		Frequency	Percentage	Lower	Upper
Cause	Fall on out-stretched hand	27	67.50	57.48	76.14
	RTA	13	32.50	23.86	42.52
Laterality	Right hand	29	72.50	62.70	80.52
	Left hand	09	22.50	15.22	31.95
	Bilateral	02	05.00	02.09	11.45
Site of fracture	Waist	24	60.00	49.87	69.34
	Proximal pole	11	27.50	19.48	37.30
	Distal pole	05	12.50	07.27	20.71
Total		40	100%	Population parameters	

3.2 Clinical profile by cause, laterality and site of fracture: The prevalence of cause as fall on out-stretched hand (80%CI 57.48-76.14) was higher than RTA (80%CI 23.86-42.52). The prevalence was highest for right hand and lowest for bilateral hands. The prevalence for site of fracture was higher for waist than proximal pole and distal pole individually. (Table 3.2)

3.3 Clinical profile by management options, time to union & rate of infection: Open reduction and internal fixation through palmar approach was the most common management option employed. The other three procedures had similar prevalence. The prevalence for time to union in months was similar in 0-3 and > 6 months groups. It was also similar in >3-4, >4-5 and >5-6 months groups. Further the prevalence was higher for >3-4, >4-5 and >5-6 months groups individually than >3-4, >4-5 and >5-6 months groups individually. The frequency of surgical site infection (SSI) was 1 (2.5%, 80%CI 0.75-7.99). (Table 3.3)

4. DISCUSSION

4.1 Scaphoid fractures by sex: Our study showed that the prevalence of scaphoid fractures in men 85% (80% CI 76.40-90.84) was higher than women 15% (80% CI 09.15-23.06). (Table 3.1) Brøndum, et al.[7] and Larsen, et al.[8] in municipality of Odense, Denmark for a period from 1982-89 found 38 men versus 8 women with scaphoid fractures per 100,000 population annually. In a span of 8 year they found 273 cases of scaphoid fracture in a population at risk of 175,000, which included 222 (81.32%) men and 51 (18.68%) women; like our' study they had higher prevalence for men. Similar to our findings are from Noaman, et al.[23] who reported 29 (64.44%) men and 16 (35.56%) women out of 45 cases of ununited scaphoid fractures from 1998 to 2007. Zhao, et al.[24] from January 2013 to December 2017 reported 132 patients with scaphoid fracture, including 103 (78%) men and 29 (22.0%) women.[24]

4.2 Scaphoid fractures by age groups: Our study showed that the prevalence of scaphoid fractures is similar in age group 17-30 (80% CI 49.87-69.34) and 31-50 years (80% CI 30.66-50.13). (Table 3.1)

According to Garala, et., in UK, males aged between 15-19 years were having highest incidence with 7,265 cases of scaphoid fracture each year.[9] In a study by Feehan, et al., annual incidence of hand fracture was 36 per 10,000, with 29 per 10,000 in >20 years and 61 per 10,000 ≤ 20 years.[11]

4.3 Scaphoid fractures by time to presentation: In our study, the prevalence of time to presentation was similar in ≤1 week and >1-4 weeks groups. It was also similar in the other three groups i.e. >4-12, >12-24 and >24 weeks. However it was higher for the first two groups individually than the last three groups individually. (Table 3.1)

4.4 Scaphoid fractures by cause: In our study, the prevalence of cause as fall on out-stretched hand was 67.50% (80% CI 57.48-76.14) and was higher than RTA 32.50% (80% CI 23.86-42.52). (Table 3.2)

Similar to our study is report from Larsen, et al.[8] in municipality of Odense, Denmark for a period from 1982-89, where cause was fall in 69% and blow in

Table 3.3: Clinical profile by management options, time to union & rate of infection in adult patients with scaphoid fractures in population of District D.I.Khan, Pakistan (n=40)

Variable	Attributes	Sample statistics		80% CI of proportion	
		Frequency	Percentage	Lower	Upper
Management options	Closed management with casting	07	17.50	11.13	26.44
	Percutaneous screw fixation	07	17.50	11.13	26.44
	ORIF through PA	11	27.50	19.48	37.30
	ORIF through DA	15	37.50	28.37	47.62
Time to union (months)	0-3	07	17.50	11.13	26.44
	> 3-4	11	27.50	19.47	37.30
	> 4-5	10	25.00	17.33	34.64
	> 5-6	08	20.00	13.15	29.21
	> 6	04	10.00	05.14	17.74
SSI	Yes	01	02.50	00.75	07.99
	No	39	97.50	92.00	99.25
Total		40	100%	Population parameters	

ORIF= open reduction and internal fixation, PA= palmar approach, DA= dorsal approach, SSI= surgical site infection

28% out of 273 cases of scaphoid fracture. Unlike us, Noaman, et al.[23] in his report published in 2011 on 45 cases, found motor cycle accident as commonest cause in 23 (51.11%), followed by fall on outstretched hand in 15 (33.33) and sport injuries in 7 (15.56%) patients.

4.5 Scaphoid fractures by laterality: In our study, the prevalence was highest as 72.50% (80% CI 62.70-80.52) for right hand and lowest 5% (80% CI 2.09-11.45) for bilateral hands. (Table 3.2)

Similar to us, Noaman, et al.[23] in his report published in 2011 on 45 cases, found right hand in 32 (71.11%) patients, whereas left hand in 13 (28.89%) patients of scaphoid fractures.

4.6 Scaphoid fractures by site of fracture: In our study, the prevalence for site of fracture was higher for waist 60% (80% CI 49.87-69.34) than proximal pole 27.50% (80% CI 19.48-37.30) and distal pole 12.50% (80% CI 07.27-20.71) individually. (Table 3.2)

4.7 Scaphoid fractures by management options: Open reduction and internal fixation (ORIF) through dorsal approach was the most common management option employed in 37.50% (80% CI 28.37-47.62) cases. The other three procedures had similar prevalence; ORIF through palmar approach as 27.50% (80% CI 19.48-37.30), and close management with casting, and percutaneous screw fixation each as 17.50% (80% CI 11.13-26.44). (Table 3.3)

Zhao, et al.[24] from January 2013 to December 2017 reported 132 patients with scaphoid fracture, requiring surgical management in 67 patients (50.8%) and conservative treatment in 65 (49.2%) patients. According to Clementson, et al.[25] in 2015, non or minimally displaced waist scaphoid fractures are given six week cast.

4.8 Scaphoid fractures by time to union: The prevalence for time to union in months was highest in >3-4 months category as 27.50% (80% CI 19.47-37.30) and lowest in >6 months category as 10% (80% CI 05.14-17.74) groups. (Table 3.3)

Higher to us, Noaman, et al.[23] in his report published in 2011 on 45 cases, found that in 43 (95.56%) of the cases the radiographic union was achieved in 12-16 weeks i.e. 3-4 months. According to Clementson, et al. in 2015, screw fixation compared with cast treatment does not reduce time to fracture union.[25] Union timings depend on various factors, like time of injury, site/ displacement of fracture, age of patient, associated diseases and treatment options.[22]

4.9 Scaphoid fractures by SSI: In our study, the frequency of surgical site infection (SSI) was 2.5% (80% CI 0.75-7.99). (Table 3.3)

4.10 Explanation: The results are placed for each group as count and percentage for sample and as estimated parameters in the form of confidence intervals (CIs) at 80% CL for population in three tables. The detailed results are not repeated in the text. The comparisons are based on CIs. If the CIs of the attributes (groups) of our study were overlapping, we say that the prevalence is similar in these groups, otherwise more or less as the case may be. Likewise are comparisons between different studies/ populations in discussion section.

5. CONCLUSION

Scaphoid fractures are more common in men and younger adults and most are presented within a week of injury. These are caused mostly by fall on outstretched hand, involving right hand and involving waist. Substantial number of cases requires open reduction with internal fixation. Mostly unite in 3-6 months.

REFFRENCES

1. Wolfe SW, Hotchkiss RN, Pederson WC, Kozin SH, Cohen MS. Fractures of carpal bones. In: Green's Operative Hand Surgery. 7th ed. Vol.1 B. Philadelphia, PA: Elsevier; 2017. p. 589.
2. Canale ST, Beaty JH. Fractures, dislocations, and ligamentous injuries of hand. In: Campbell's Operative Orthopedics. 12th ed. Volume 4, Part 1. Philadelphia, PA: Elsevier Mosby; 2008. p. 3395.
3. Sabbagh T, Morsy M, Moran SL. Diagnosis and management of acute scaphoid fractures. Hand Clinics 2019; 35 (3):259-69. https://doi.org/10.1016/j.hcl.2019.03.002
4. Fowle JH, Hughes TB. Scaphoid fractures. Clin Sports Med 2015; Jan34 (1):37-50. https://doi.org/10.1016/j.csm.2014.09.011
5. Kahl T, Razny FK. Diagnosis of the scaphoid bone: fractures, nonunion, circulation, perfusion [article in German]. Orthopedics 2016 Nov; 45(11):938-44. https://doi.org/10.1007/s00132-016-3333-y
6. Reigstad O, Thorkildsen R, Grimsgaard C, Melhuus K, Røkkum M. Examination and treatment of scaphoid fractures and pseudarthrosis. Tidsskr Nor Laegeforen 2015 Jun 30; 135(12-13):1138-42. https://doi.org/10.4045/tidsskr.14.1256
7. Brøndum V, Larsen CF, Skov O. Fracture of the carpal scaphoid: frequency and distribution in a well-defined population. Eur J Radiol 1992 Sep; 15(2):118-22. https://doi.org/10.1016/0720-048X(92)90135-V
8. Larsen CF, Brondum V, Skov O. Epidemiology of scaphoid fractures in Odense, Denmark. Acta Orthop Scand 1992 Apr; 63(2):216-8. https://doi.org/10.3109/17453679209154827
9. Garala K, Taub NA, Dias JJ. The epidemiology of fractures of the scaphoid: impact of age, gender, deprivation and seasonality. Bone Joint J 2016 May; 98-B (5):654-9. doi: 10.1302/0301-620X.98B5.36938 https://doi.org/10.1302/0301-620X.98B5.36938
10. Van Tassel DC, Owens BD, Wolf JM. Incidence estimates and demographics of scaphoid fracture in the U.S. population. J Hand Surg Am 2010

Aug; 35(8):1242-5. https://doi.org/10.1016/j.jhsa.2010.05.017

11. Feehan LM, Sheps SB. Incidence and demographics of hand fractures in British Columbia, Canada: a population-based study. J Hand Surg Am 2006 Sep; 31(7):1068-74. https://doi.org/10.1016/j.jhsa.2006.06.006
12. Duckworth AD, Ring D, Mc Queen MM. Assessment of suspected scaphoid fractures. J Bone Joint Surgery 2011; 93:713. https://doi.org/10.1302/0301-620X.93B6.26506
13. Kozin SH. Incidence, mechanism and natural history of scaphoid fractures. Hand Clin 2001; 17(4):515-24.
14. Langer MF. Anatomy and biomechanics of the scaphoid. Orthopedics 2016 Nov; 45(11):926-37.
15. Gelbermann RH, Menon J. The vascularity of the scaphoid bone. J Hand Surg (Am) 1980; 5(5):508-13. https://doi.org/10.1016/S0363-5023(80)80087-6
16. Andreas F, Sebastian G. Occult scaphoid fractures; current evidence and diagnostic algorithm. Unfallchrinrurg 2020 Mar; 123(3):238-43.
17. Zwart AD. Comparison of MRI, CT and bone scintigraphy for suspected scaphoid fractures. Eur J Trauma Emerg Surg 2016 Dec; 42(6):725-31. https://doi.org/10.1007/s00068-015-0594-9
18. Werner AA, Sauerbier M, Mehling IM. Current concept for the treatment of acute scaphoid fractures. Eur J Trauma Emerg Surg 2016 Feb; 42(1):3-10. https://doi.org/10.1007/s00068-015-0587-8
19. Jernigan EW, Morse KW, Carlson MG. Managing the athlete with a scaphoid fracture. Hand Clinc 2019 Aug; 35(3):365-71. https://doi.org/10.1016/j.hcl.2019.03.011
20. Li H, Guo W, Guo S, Zhao S, Li R. Surgical versus nonsurgical treatment for scaphoid waist fractures with slight to no displacement; A meta-analysis and systemic review. Medicine (Baltimore) Nov 2018; 97(48):13266. https://doi.org/10.1097/MD.0000000000013266
21. Borges CS, Ruschel PH, Pignataro MB. Scaphoid reconstruction. Orthop Clin North Am Jan; 51(1):65-76. https://doi.org/10.1016/j.ocl.2019.08.010
22. Noaman HH, Shiha AE, Ibrahim AK. Functional outcomes of nonunion scaphoid fracture treated by pronator quadratus pedicled bone graft. Ann Plast Surg 2011 Jan; 66(1):47-52. https://doi.org/10.1097/SAP.0b013e3181d375f9
23. Statistics Kingdom. Proportion confidence interval calculator [internet]. Statistics Kingdom; Melbourne, Australia 2007. [accessed 2020 Jan 17]. Available at: http://www.statskingdom.com/41_proportion_confidence_interval.html
24. Clementsen M, Thomsen N, Bjorkman A. Scaphoid fracture guidelines for diagnosis and treatment. Lakartidningen 2019 Jun 18; 116: FL9M.
25. Zhao H, Tian S, Kong L, Bai J, Lu J, Zhang B, et al. Factors associated with union time of acute middle third scaphoid fractures; an observational study. Ther Clin Risk Manag 2018 Jun 19; 14:1127-31. https://doi.org/10.2147/TCRM.S169310

CONFLICT OF INTEREST
Authors declare no conflict of interest.
GRANT SUPPORT AND FINANCIAL DISCLOSURE
None declared.

AUTHORS' CONTRIBUTION

The following authors have made substantial contributions to the manuscript as under:

Conception or Design:	MSK, NR
Acquisition, Analysis or Interpretation of Data:	MSK, NR, KH, MZF
Manuscript Writing & Approval:	MSK, NR, KH, MZF

All the authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.