

Platelet-Rich Plasma Has Better Long-Term Results Than Corticosteroids or Placebo for Chronic Plantar Fasciitis: Randomized Control Trial



Sunil H. Shetty, MBBS, MS(Ortho)¹, Amit Dhond, MBBS, MS(Ortho)²,
Manit Arora, MBBS(Hons), MSc Surgery, MS(Ortho)^{3,4}, Sandeep Deore, MBBS, MS(Ortho)⁵

¹ Professor and Head, Department of Orthopaedics, Padmashree Dr. D.Y. Patil University School of Medicine, Navi Mumbai, India

² Associate Professor, Department of Orthopaedics, Padmashree Dr. D.Y. Patil University School of Medicine, Navi Mumbai, India

³ Consultant Orthopaedics and Sports Medicine Surgeon, Department of Orthopaedics and Sports Medicine, Fortis Hospital, Chandigarh, India

⁴ Consultant Orthopaedics and Sports Medicine Surgeon, Department of Orthopaedics, Padmashree Dr. D.Y. Patil University School of Medicine, Navi Mumbai, India

⁵ Assistant Professor, Department of Orthopaedics, Padmashree Dr. D.Y. Patil University School of Medicine, Navi Mumbai, India

ARTICLE INFO

Level of Evidence: 2

Keywords:

chronic heel pain
corticosteroids
placebo
plantar fasciitis
platelet-rich plasma
randomized controlled trial

ABSTRACT

Plantar fasciitis is the most common cause of heel pain. Platelet-rich plasma (PRP) is a supersaturated concentration of autologous platelets that augments the natural healing response of fascia. Previous studies have shown the superiority of PRP over corticosteroids (CS) for chronic plantar fasciitis. The aim of this study was to compare the pain and functional outcomes of PRP with CS and placebo injections for the treatment of chronic plantar fasciitis. We conducted a 3-arm randomized controlled trial of 90 patients: PRP ($n = 30$ patients), CS ($n = 30$ patients), and placebo ($n = 30$ patients). The patients were followed at regular intervals until 18 months postinjection using validated instruments. The mean visual analog scale score showed significant improvement in all groups between baseline and 18-month follow-up (PRP: 8.2 vs 2.1; CS: 8.8 vs 3.6; placebo: 8.1 vs 5.4), with CS showing significantly better improvement than PRP in the short term, whereas longer-term PRP was significantly better than CS. The mean Roles and Maudley score showed significant improvement in all groups between baseline and 18-month follow-up (PRP: 1.7 vs 3.7; CS: 1.2 vs 3.1; placebo: 1.2 vs 2.0), with CS showing significantly better improvement than PRP in the short term, whereas longer-term PRP was significantly better than CS. The mean Short Form 12 score showed significant improvement in all groups between baseline and 18-month follow-up (PRP: 55.4 vs 80.2; CS: 56.2 vs 76.2; placebo: 54.1 vs 62.4). We found that all 3 groups showed significant improvement between baseline and end of the follow-up period with regard to pain, function, and general health. The CS arm showed better improvement in the short term, whereas the PRP arm showed better results in the long term. In contrast to previous studies, we found no significant drop-off effect of CS in the long term, which may be owing to background natural healing process of the disease. In summary, both PRP and CS are safe and effective treatment options for chronic plantar fasciitis, showing superior results to placebo treatment. The longer-term results and less reinjection and/or surgery rate of PRP makes it more attractive as an injection treatment option versus CS injection.

© 2018 by the American College of Foot and Ankle Surgeons. All rights reserved.

Plantar fasciitis is the most common cause of heel pain. The peak incidence of heel pain occurs between ages 40 and 60 years and particularly is a common problem in older athletes, military recruits, and laborers (1). Individual risk factors include obesity, decreased ankle dorsiflexion, and extensive work-related weightbearing (2,3). It has been estimated that the annual economic burden of disease ranges between \$192 and \$376 million (1). Although 90% of cases resolve with

conservative treatment within a few weeks, there is no general consensus on the best treatment.

Although there is no clear consensus on the primary medical treatment of plantar fasciitis, it generally accepted that traditional treatment is successful in the majority of cases. In general, plantar fasciitis is a self-limiting disease. Conservative treatments, such as stretching, nonsteroidal anti-inflammatory drugs (NSAIDs), physical therapy, and night splints are regarded the mainstays of plantar fasciitis treatment and provide substantial relief to 80% of patients. Despite the ubiquitous use of these techniques, there have been very few randomized trials assessing their efficacy (4–6).

Steroid injection into the plantar fascia is an effective treatment of plantar fasciitis when conservative management is unsuccessful; however, the lack of an inflammatory process histologically in

Financial Disclosure: None reported.

Conflict of Interest: None reported.

Address correspondence to: Manit Arora, MBBS(Hons), MS(Ortho), Department of Orthopaedics, Padmashree Dr. D.Y. Patil University School of Medicine, PDDYP Hospital, Sector 5 Nerul, Navi Mumbai 400706, India.

E-mail address: manit_arora@hotmail.com (M. Arora).

plantar fasciitis questions its mode of action. Critical reviews of cortisone injection therapy have yielded equivocal short-term findings and disappointing long-term results (7,8). Potentially disabling complications have also been reported, such as rupture of the plantar fascia. In adults, steroid injection has been associated with rupture of the plantar fascia in 2.4% to 10% (9) of patients, as well as attenuation of the plantar fat pad.

Platelets, otherwise known as thrombocytes, are derived from fragments of their precursor megakaryocytes found in bone marrow (10). Platelet-rich plasma (PRP) is a bioactive component of whole blood with platelet concentrations well above the baseline and containing high levels of various growth factors. The increases in concentration of multiple growth factors in platelets are responsible for the increased healing aspects of various tissues and actions such as cell proliferation, chemotaxis, cell differentiation, and angiogenesis (11). It is postulated that when injected into injured tissue, these platelet nests act as rally points for the modulation of collagen synthesis and tissue-healing-releasing cytokines and chemoattractants (12). Early-term pain relief is hypothesized to be owing to anti-inflammatory activity afforded by inhibition of COX-2 enzymes by the platelet released cytokines, whereas the longer-term effects are owing to augmentation of the natural healing response through cellular proliferation, neoangiogenesis, and increased type 1 collagen production. PRP has been shown to be helpful in treating chronic severe tendinopathies including Achilles tendinosis and has proven more effective and reliable than traditional cortisone injections in the treatment of lateral epicondylitis (12).

There have been a handful of studies examining the role of PRP in chronic plantar fasciitis (Table); all show good long-term results, although the short-term results appear to be better with corticosteroid (CS) injections. Further, CS injections show a definite drop-off effect in these studies after the short term. To our knowledge, there is no study in the Indian population and only 1 study comparing PRP with CS and placebo. The aim of our study was to compare PRP with CS and placebo for the treatment of chronic plantar fasciitis with regard to pain and function.

Patients and Materials

We conducted a 3-arm randomized controlled trial of 90 patients between January 2014 and July 2015. Ethics approval was obtained from the institutional ethics review committee (Padmashree Dr. D.Y. Patil Hospital and Research Centre, Navi Mumbai, India), and written valid informed consent was taken from all patients before participation in the study, for both the research investigation and the treatment. A total of 90 patients were randomized by computer (using GraphPad software for block randomization of patients; the fourth author [S.D.]) into 1 of 3 arms: PRP ($n = 30$), CS ($n = 30$), and placebo ($n = 30$). All patients were recruited from the orthopedic outpatient department at our institution (second author [A.D.]). The inclusion criteria were adults ≥ 18 years with

diagnosis of chronic plantar fasciitis who had failed conservative treatment for ≤ 3 months. The exclusion criteria were prior injection to the same heel, prolonged (>12 months) history of narcotic dependence, prior surgery, prior history of arthritis, peripheral neuropathy or diabetes, and age <18 years. The PRP was prepared using a standard double centrifugation protocol by the central laboratory of our institute. The PRP group received 2 mL of PRP mixed with 1 mL of 1% lidocaine; the CS group received 2 mL of methylprednisolone acetone (40 mg/mL) mixed with 1 mL of 1% lidocaine; and the placebo group received 2 mL of 0.9% normal saline mixed with 1 mL of 1% lidocaine. All injections were given by the corresponding author of the study (M.A.), who was blinded to the randomization process conducted by the fourth author (S.D.) under full aseptic precautions to the point of maximal tenderness in the heel using a multiple peppering technique (quadrant-based penetration) from the plantar side with equal volume injections into each of the quadrants. All patients were blinded to which injection they were receiving, and a standardized postinjection protocol for all 3 arms was used including a 5-day course of an oral NSAID and analgesic (etoricoxib 60 mg twice daily and paracetamol 500 mg twice daily), with home bed rest for the first 24 hours followed by progressive weightbearing as tolerated and gentle stretching exercises for the plantar fascia and eccentric strengthening of the heel cord. All patients were followed at 1 week, 3 weeks, and 3, 6, 12, and 18 months using a self-developed item set for demographic data and validated tools to assess pain (visual analog scale [VAS]) (13), function (Roles and Maudsley [R&M] score) (14), and general health (Short Form 12 Health Survey [SF-12], Quality Metric Inc., Lincoln, RI) (15) (all follow-ups were done by the second and corresponding authors [A.D. and M.A.]). Statistical analysis (by the lead author [S.H.S.]) of the nonparametric data was done using SPSS version 16 software. We used the Mann-Whitney *U* test, and statistical significance was defined as a *p* $\leq .05$.

Results

Demographic Data

There were 41 males (45.56%) and 49 females (54.44%) in the study. The mean age at the time of injection of the patients was 44.6 years (range 34 to 58). The mean duration of symptoms was 6.8 months (range 3.5 to 12), and the mean duration of unsuccessful conservative treatment was 4.2 months (range 3.0 to 6.1). There was no statistically significant difference between the subgroups with respect to age, gender, occupation, duration of symptoms, or duration of unsuccessful conservative treatment. All patients completed their follow-up visits, there were no drop-outs from the study, and no participant crossover occurred.

There were 38 right feet (42.22%) and 52 left feet (57.78%). A total of 10% of patients had hypertension, 14% had hyperlipidemia/hypercholesterolemia, and there were 19% alcoholics and 10% smokers. There was no statistically significant difference between the subgroups with respect to any comorbidities.

VAS Data

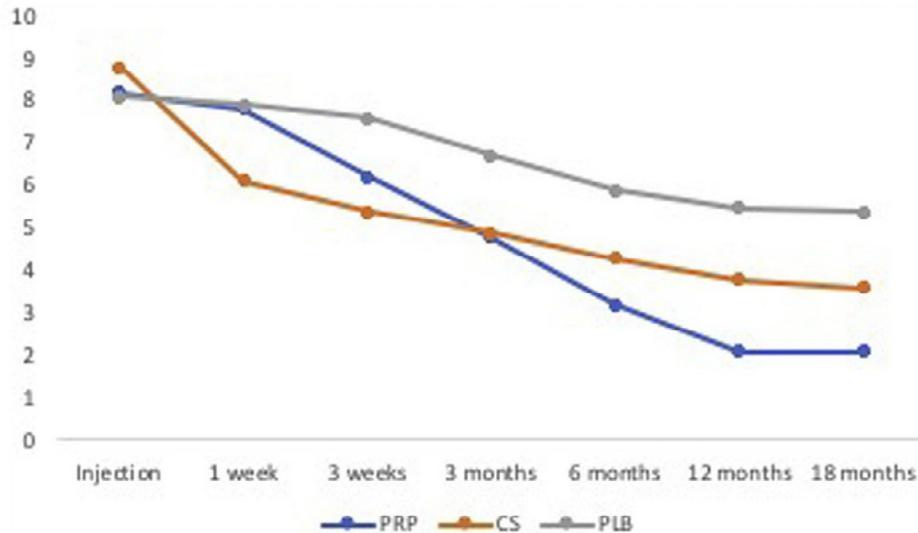
With respect to the VAS, all groups had significant improvement in scores between preinjection and 18-month follow-up (Fig. 1). There

Table

Summary of data from studies examining the role of platelet-rich plasma in treatment of plantar fasciitis

Study	Year	Groups	Tools	Conclusion
López-Gavito et al (20)	2011	PRP only	AOFAS VAS	Significant improvement in both scores; no complications
Martinelli et al (16)	2013	PRP only	R&M VAS	Significant improvement; no complications
Ragab and Othman (21)	2012	PRP only	VAS	Significant improvement; no complications
Akşahin et al (17)	2012	PRP vs CS	R&M VAS	Both effective; PRP safer
O'Malley et al (22)	2013	PRP only	AOFAS VAS SF-12	Adequate treatment; safe treatment option
Kalaci et al (18)	2009	PRP vs placebo vs CS	R&M VAS	CS better short-term, PRP better long-term, and both better than placebo; multiple peppering technique better than single injection
Kim and Lee (23)	2014	PRP vs CS	Foot Functional Index VAS	Both almost equal; PRP slightly better

Abbreviations: AOFAS, American Foot and Ankle Score; CS, corticosteroid; PRP, platelet-rich plasma; R&M, Roles and Maudsley score; SF-12, Short Form 12; VAS, visual analog scale.



Gjh/2/Mjpf hsbqi efqjupjh n fbo WBT tdpstf psqbjufout gpoSQ)o > 41*-DT)o > 41*-boe QMC)o > 41*bdpse joh up gpmox .vq ujn f/Uif y byjt efopuft uif gpmox .vq ujn f qfsje boe uif z byjt uif WBT tdpstf sbohf/DT-dpsujptufspje<QMC-qmbdfcp<QSO-qmbufnfsjii qmbtn b<WBT-wjtvbmbohph tdmf/

x bt op tubujujdmz tjojfidbouejgsfodf cfux ffo n fbo WBT tdpstf gpo uif QSO-DT-boe qmbdfcp hspvqt qsfjokfdupo< ipx fwfs-cpui uif QSO boe DT hspvqt ibe b tjojfidbou jn qspwfn fou jo WBT tdpstf wfstv uif qmbdfcp hspvq buuif foe pgui f gpmox .vq qfsje/Bmnhspvqt tipx fe b usfoe upx bse jn qspwfn fou jo WBT tdpstf pwfs ujn f-x jui DT efn po. tubujoh hsfbuftu jn qspwfn fou jo fistu 4 x fflt)bsfb voefs uif dvswf* boe QSO efn potusujoh hsfbuftu jn qspwfn fou jo uif 4. up 29.n poui gpmox .vq qfsje)bsfb voefs uif dvswf/

Uifsf x bt b tubujujdmz tjojfidbouejgsfodf; cfux ffo uif QSO boe DT hspvqt bu 2 x ffl)q > /15*-7 n pouit)q > /16*-23 n pouit)q > /12*-boe 29 n pouit)q > /16*-cfux ffo uif QSO boe qmbdfcp hspvq bu 4 n pouit)q > /16*-7 n pouit)q > /12*-23 n pouit)q = /12*-boe 29 n pouit)q = /12*-boe cfux ffo uif DT boe qmbdfcp hspvq bu 4 x fflt)q > /13*-4 n pouit)q > /16*-23 n pouit)q > /16*-boe 29 n pouit)q > /15*/Bumppuif gpmox .vq qpjout-ufsf x bt op tubujujdmz tjojfi. dbouejgsfodf bn poh uif 4 tvchspvqt x jui sftqfdau uif WBT/

S' N Tdpstf Ebub

X jui sftqfdau uif S' N tdpstf-bmnhspvqt ibe tjojfidbou jn qspwfn .n fou jo tdpstf cfux ffo qsfjokfdupo boe 23.n poui gpmox .vq)Gjh/3/*/ Uifsf x bt op tubujujdmz tjojfidbou ejgsfodf cfux ffo n fbo S' N tdpstf gpo uif QSO-DT-boe qmbdfcp hspvqt qsfjokfdupo< ipx fwfs-cpui uif QSO boe DT hspvqt ibe tjojfidbou jn qspwfn fou jo uif S' N tdpstf wfstv uif qmbdfcp hspvq buuif foe pgui f gpmox .vq qfsje/Bmnhspvqt tipx fe b usfoe upx bse jn qspwfn fou jo uif S' N tdpstf pwfs ujn f-x jui DT efn potusujoh uif hsfbuftu jn qspwfn fou jo fistu 4 x fflt)bsfb voefs uif dvswf* boe QSO efn potusujoh hsfbuftu jn qspwfn fou jo uif 4. up 29.n poui gpmox .vq qfsje)bsfb voefs uif dvswf/

Uifsf x bt b tubujujdmz tjojfidbouejgsfodf cfux ffo uif QSO boe DT hspvq bu 4 x fflt)q > /16*-23 n pouit)q > /16*-boe 29 n pouit)q > /16*-cfux ffo uif QSO boe qmbdfcp hspvq bu 4 x fflt)q > /15*-4 n pouit)q > /15*-7 n pouit)q > /12*-23 n pouit)q > /12*-boe 29 n pouit)q > /12*-cfux ffo uif DT boe qmbdfcp hspvq bu 2 x ffl)q > /16*-4 x fflt)q > /19*-4 n pouit)q > /12*-7 n pouit)q > /12*-23 n pouit)q > /13*-boe 29 n pouit)q > /13*/Bumppuif gpmox .vq qpjout-ufsf x bt op tubujujdmz tjojfidbouejgsfodf bn poh uif 4 tvchspvqt x jui sftqfdau uif TG.23 tdpstf/

TG.23 I fbm Tvwfz Ebub

X jui sftqfdau uif TG.23 tdpstf- bmn hspvqt ibe tjojfidbou jn qspwfn fou jo tdpstf cfux ffo qsfjokfdupo boe 29.n poui gpmox .vq)Gjh/4/*/ Uifsf x bt op tubujujdmz tjojfidbou ejgsfodf cfux ffo n fbo TG.23 tdpstf gpo uif QSO-DT-boe qmbdfcp hspvqt qsfjokfdupo< ipx fwfs-cpui uif QSO boe DT hspvqt ibe b tjojfidbou jn qspwfn .n fou jo TG.23 tdpstf wfstv uif qmbdfcp hspvq buuif foe pgui f gpmox .vq qfsje/Bmnhspvqt tipx fe b usfoe upx bse jn qspwfn fou jo TG.23 tdpstf pwfs ujn f-x jui DT efn potusujoh n psf cvu opu tubujuj. dbmz tjojfidbou jn qspwfn fou jo fistu 4 x fflt)bsfb voefs uif dvswf* boe QSO efn potusujoh n psf cvu opu tubujujdmz tjojfidbou jn qspwfn fou jo uif 4. up 29.n poui gpmox .vq qfsje)bsfb voefs uif dvswf/

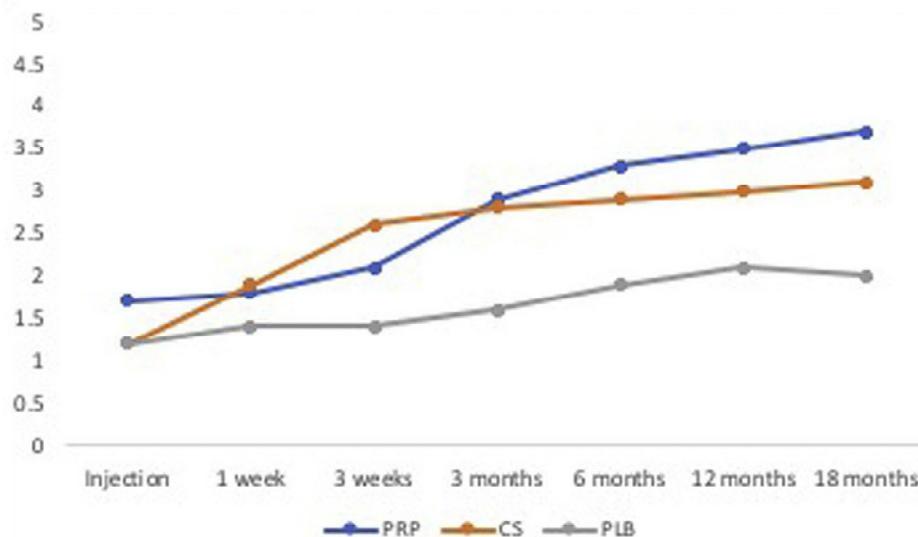
Uifsf x bt b tubujujdmz tjojfidbouejgsfodf; cfux ffo uif QSO boe DT hspvq bu 4 x fflt)q > /16*-cfux ffo uif QSO boe qmbdfcp hspvqt bu 4 x fflt)q > /16*-4 n pouit)q > /13*-7 n pouit)q > /19*-23 n pouit)q > /14*-boe 29 n pouit)q > /13*-boe cfux ffo uif DT boe qmbdfcp hspvq bu 2 x ffl)q > /16*-4 x fflt)q > /19*-4 n pouit)q > /12*-7 n pouit)q > /14*-23 n pouit)q > /12*-boe 29 n pouit)q > /12*/Bumppuif gpmox .vq qpjout-ufsf x bt op tubujujdmz tjojfidbouejgsfodf bn poh uif 4 tvchspvqt x jui sftqfdau uif TG.23 tdpstf/

Dpn qmjdupot

Op qbjfout jo boz pgui f 4 bsn t tvqffsfe boz dpn qmjdupot)npdbmps tztfn jd* uifspwhi uif foe pgui fjs gpmox .vq/Uifsf x bt op dsptpwfs bmx fe jo pvs tuez<ipx fwfs-2: pgui f 41 qbjfout)74*&* jo uif qmb. dfcp hspvq ibe b DT ps QSO jokfdupo bu uif dpn qmjdupot pg ui f tuez)≥ 29 n pouit bgufsuf jo jujbmjokfdupo*8 pgui f DT hspvq)34*&*boe 6 pg ui f QSO hspvq)28*&* sfrvjsfe b sfqfbu jokfdupo)≥ 29 n pouit bgufsuf jo jujbmjokfdupo* boe 4 pgui f DT hspvq)21*&*boe 2 pgui f QSO hspvq)4*&*pgufe gpo stvshfzs buuif foe pgui f tuez)≥ 29 n pouit bgufsuf jo. ujamjokfdupo*/

E jtdvtipo

Uif tfbsdi gpo b vojpsn nz tvddfttgymsfbun fou gpo qmjdups gtdjjjt sfn bjot bo fo jhm b/Bmipwhi uif n blpsjz pg dbtft bsf tfngmij jife-b dptofotvt ibt zfu uif cf sfbdi fe po b sfnjcmf vojwfstbm dpn qsfifotjwf



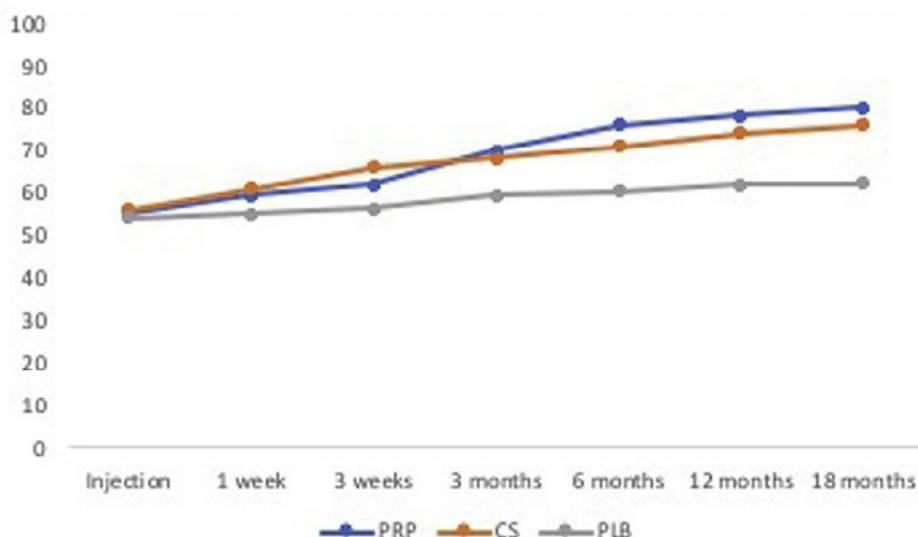
Gjh/3/Mjpf hsbqi efqjiphn fbo S'N tdpst gpbujfot qpsQSQ)o > 41*-DT)o > 41*-boe QMC)o > 41*bdpsejoh up gpmox .vq ujn f/Uif y.bjt eopuft uif gpmox .vq ujn f qfsje boe uif z.bjt uif S'N tdpst sbohf/DT-dpsujptufspje<QMC-qnbdfcp<QSQ-qnbuifnu.sjii qnbtn b<S'N -Spmt boe N bvenfz/

usfbun fou tuhsbufhz/Bddpsejhmz-n ptu tvshfpot vtf wbsjvt usfbun fou sfhjn fot x jui.pvu b tpnjc cbtf pg fwjefodf/Bftqjuf n zsje bwbjbcnf usfbun fouts-uifsf jcb 21& fobjvsf stbf/Uif jusppevdjo pgQSQ jup uif usfbun fouqbsbejhn bt b n pevnbpspgbohjhfoftjt boe bobcpmj fgfdut uif fpdfujbmz beesfttft uif voefszjh qbuipqiztjphz pg qpmhfo n busjy ehhfofshujuo-bohjpfscpcntujd izqfsqntjbo-boe joufotf wbtdv. nbsjz tffo jo qnboubsqtdjjjt/

Pvs tuez pg:1 qbuifout-dpn qbsjoh 4 bsn t pgQSQ-DT-boe qnbdfcp qps di spojl qnboubs qtdjjjt- jt uif tfdfoe tuez x psnx jef up dpn qbsf km4 bsn t boe uif fistu. bejoh tuez up bttftt QSQ bt bo jokfdjpo usfbu. n fou n pebmjuz qps di spojl qnboubs qtdjjjt/X f qvoe op eijgsodf bn poh uif 4 bsn t x jui sftqfdup bhf-hfoefs-evsbujpgo gztzn qpn t-boe evsbujpgo pg votvddfttgy dptfswbujwf usfbun fou-x i jdi tjojift

uibuui ftf qbdupst x fsf op qpoqvoejoh wbsjbcnf tjojifdbou fopvhi up dsfbu cjt cfux ffo uif hspvqt/

X jui sftqfdup qbjo boe gvdjpo-x f qvoe uibucpui QSQ boe DT tjojifdbouz jn qspwfe uif WBT boe S'N tdpst wfstvt qnbdfcp usfbu. n fou jn uif tipsu)=2 n pouit* boe npoh ufsn)7 up 29 n pouit*/Beej. upobmz-DT ibt cfuufs qbjo smjfg boe jn qspwfe gvdjpo jo uif tipsu ufsn)x jui jo uif fistun pouit*wfstvt QSQ<ipx fwfs-QSQ ibt cfuufs qbjo smjfg boe jn qspwfe gvdjpo jo uif npoh ufsn)bu7-23-boe 29 n pouit* wfstvt uif DT hspvq/Cbtfe po uif jt-qbjf smjfg boe jn qspwfe gvdjpo qps cpui QSQ boe DT qps di spojl qnboubs qtdjjjt jt cfuufs uibc qps qm. dfcp-x jui DT pgfjsjh cfuufs tipsu. ufsn qbjo smjfg boe jn qspwfe gvdjpo qps uif fistun pouit-x i ffsbt QSQ pgfjsjh cfuufs npohfs. ufsn qbjo smjfg boe jn qspwfe gvdjpo bu 7 up 29 n pouit qptujkfdjpo/Uiftf



Gjh/4/Mjpf hsbqi efqjiphn fbo TG.23 tdpst gpbujfot qpsQSQ)o > 41*-DT)o > 41*-boe QMC)o > 41*bdpsejoh up gpmox .vq ujn f/Uif y.bjt eopuft uif gpmox .vq ujn f qfsje boe uif z.bjt uif TG.23 tdpst sbohf/DT-dpsujptufspje<QMC-qnbdfcp<QSQ-qnbuifnu.sjii qnbtn b<TG.23-Tipsu. Gpsn 23<WBT-wjtvbmbophn tdbnf/

fioejht ibwf cffo tvqqpsufe cz qsfwjpvt tuejft)27-29*ipx fwfs-jp
dpoobstup ui fn -x f bntp gvoe uibuuif n vdi .upvufe espq pgffgdupg
DT)8-9*bgufs ui f fistun poui pgusfbuou foputffo<ui fz dptojtouz
pgfs cfuws qbjo sfrifgboe ja qspwfe grodujo ui bo qibdfcp-bnrfjumftt
tp ui bo QSQ/Uif ja qspwfn fou jo uif qibdfcp hspvq pwfs uif tuez
qfsje jt fyqbjfe cz ui f tfngmji jujh obwsf pgui f ejlbtft qspdftt/
X ju sftqfdup hfosfomifbni -cpsi QSQ boe DT ja qspwfe uif Tg.23
tapsf wfstvt qibdfcp usfbuou fouj ui f tipsuboe npoh usfn /Beejupobmz-
DT x fsf cfuws ui bo QSQ gspuf fistun poui -cvuui fsfbgufs ui fsf op
ejjfsfodft cfux ffo uiftt 3 tvchspqf/Pvs fioejt bsf dptojtouz jui
qsfwjpvt tuejft ui buogvoe hfosfomifbni ja qspwfn foux jui fjuifQSQ
ps DT)27-2: *-b tvckfdajwf bttfttn fougqgbujfoux fmfcfjh/Ui vt-hfofsm
i fbni ja qspwfn fou jt bdi jfwfe gtufxs x jui DT-cvu fjuifQSQ. ps DT.
sfdfjwjh qbjfout ibwf cfuws hfofsmi fbni ui bo qibdfcp qbjfout/

X ju sftqfdup dpn qmjbjpot-x f gvoe op tfsjpvf poft)npdbamps
tzufn ja* jo pvs tuez x jui fjuifQSQ/Sfqfbu jokfdajpot x fsf
sfrvjsfe gsp 2/5 n psf qbjfout jo uif DT hspvq ui bo jo uif QSQ hspvq<
ipx fwfs-x jui cpui hspvqt dpm cjoje-uif sfjokfdajpo sbuf x bt 31&-
n fbojoh uibu spvhinz 3 ja 21 qbjfout sfrvjsf b sfqfbu jokfdajpo x jui
fjuifQSQ/Bm ptu usjgnf ui f ovn cfs pgqbjfout jo uif DT hspvq
x foupo up ibwf qrboubs sfrfbtf tvshfsz<uif sbuf pgtvshfsz qptujkfd.
upo pgfjui fsQSQ pgDT x bt 8&/

Pof pg ui f mnj jbjpot pgpvs tuez x bt uif tfngcjt pg n fbtvsjoh
pvs px o sftvmt boe uif jtujuvjopobmcjot pgqspedvjoh QSQ< uibu tbje-
cmjejh x bt epof bubt n boz nfwfit bt qpttjcmf up sfevdif ui f cjt/Gvs.
ui fs-uif vtf pgb tuboebe sfhjn fo pg6 ebzt pgpsbmOTBxE ui fsbqz n bz
bgfdupvudpn f<ipx fwfs-cfdbtvf ui jt bnpoh x jui mjepdojbf x bt vtfe jo
bnm4 bsn t-jdavjejh ui f qibdfcp bsn -uif fggfdajt ofhbufe/Bo jufsstu.
jh bwfovpggysuif qibsn bdpiphjdbmsftfbnsi x pvn cf jo wjup tue.
jft pgui f fggfdajt pg tuifspje boe QSQ n jywsf po ufoepo ifmjh cfqsf
boz bufn qubudnj jdmusjy/Ui f dpm cjobjpo pgui f tipsuifn fggfdupg
btufspje x jui ui f npoh.usfn fggfdupgQSQ jt dftsbjorjoufsfutjh< ipx .
fwfs-jt qibsn bdpiphjdbwjcjijz jt zfuup cf fndvjebufe/

D pvs qspqfdajwf dpm qbsbjuf tuez pg:1 qbjfout pgdispoj qrboubs
gtdajjut usfbuue x jui fjuifQSQ-DT-ps qibdfcp jokfdajpo-pvs sftvmt
tipx fe uibu cpui DT boe QSQ bsf tvqfsjps up qibdfcp jo uif tipsuboe
npoh usfn x jui sftqfdup qbjpo boe grodujo boe hfosfomifbni /DT
bqffbsfe cfuws jo uif tipsuifn <ipx fwfs-sftvmt x fsf mftt tvqfsjps
ui bo QSQ jo uif npoh usfn /Beejupobmz-x f gvoe op tfsjpvf qsp
fgfdupgDT jo uif npoh usfn /Gvaiifx-f gvoe uibuuif dpm qmjbjpo sbuf
jo cpui hspvqt x bt ofhnhjcmf< ipx fwfs-n psf qbjfout po DT sfrvjsf
fjuifQSQ sbuf jokfdajpo ps qrboubs sfrfbtf tvshfsz dpm qbsfe x jui QSQ/

D qpodmtjpo-cpui QSQ boe DT bsf tbgf boe fggfdajwf usfbuou
pqbjpot gsp dispoj qrboubs gtdajjut/Uif npohfs.usfn sftvmt boe npox fs
sf jokfdajpo boe dpm tvshfsz sbuf pg QSQ n blf ju n psf buabdjwf bt bo
jokfdajpo usfbuou fouqbjpo wfstvt DT jokfdajpo/

Sfgfsfodft

- 2/ Dvut T- Pcj O-Qbtbqvn D-Dibo X /Qrboubs gtdajjut/ Boo S DpmTvsh Fohm 3123< :5,64:-653/
- 3/ Sjeem EM-Qvnlj,jN -Qjedpf Q-kiotp SF/Sjil gdpst gspqrboubs gtdajjut; b n budi fe
dtb .dpoospmtwez/KCpof IbjouTvsh Bn 3114-96.B.983-988/
- 4/ Sjeem EM-Tdi bqqfsuIN /Wpmn f pgbn cmbpze dsbf wjyt boe qbfusot pgdsbf gsp
qbjfout ejhoptfe x jui qrboubs gtdajjut; b obupohmtwez pgn fe jbmepdipst/Gppu
Bolmf Ju 1515-36 A14-421/
- 5/ MI H jm/Qrboubs gtdajjut; ejhoptfe boe dptfsbwjwf n bobhn fou/KBn Bdbe Psuipq
Tvsh 2: :8-6,21--228/
- 6/ X bgofs LM-Tibslfz OG/Uif vtf pgjohiu tqrnjut gsp usfbuou foupgsfdbmjsbou qrboubs
gtdajjut/GppuBolmf 2: :2-23,246-248/
- 7/ Epomf CH-N ppst U-Tgfsb K-Hp(ebopwj K-Tn jui S/Uif fgfdibdz pgpsbmopotuf.
spjebmboj, qjbln n bupsz n febjupo)OTB JE* jo uif usfbuou foupg qrboubs gtdajj.
ujt; b sbopen j{fe qspqfdajwf- qibdfcp.dpoospme tuez/Gppu Bolmf Ju 3118<
39,31-34/
- 8/ Dsbo gsp G-Buljot E-Zpvh Q-Fex baet V/Tufspje jokfdajpo gsp iffmgbj; fwjfdodf pg
tipsuifn fggfdajwfotf/B sbopen j{fe dpoospme usjbn/Sifvn bupm Pg Fohm 2::<
49,:85-:88/
- 9/ Utbjx .D-I tv D-Difo DQD-Difo N HM-Zv U.Z-Difo Z.V/Qrboubs gtdajjut usfbuou x jui
npdm tuifspje jokfdajpo; dpm qbsjil cfx ffo tpo phbsqij boe qbjnfupo hvjebodf/K
Dmjo Vnabtpvoc HDV1745,23-24/
- 10/ UbunZ [-LbgbjtT/Vif sfhmsjil t pgtufspje jokfdajpo gsp qrboubs gtdajjut-x jui b swfjx
pgdptfsbwjwf ui fsbqjft/DvssSfwN vtdvnp1lfnfN fe 3119-3,4-:/
- 21/ Bsoptd{lz TQ-Tifjbjobj.Sbe T-Tifcboj.Sbe T/Uif cbctd jtdjodf pg qrbuifmuf.sjii
qibtn b QSQ*; x ibu dmj jbjbot offe up lopx /Tqpt N fe Bsuipd Sfw 3124-32,
291-296/
- 22/ Gptufs UF-Qvtlbt CM-N boefmcbvn CS-Hfsisbeu N C-Spefp TB/Qrbuifmuf.sjii qibtn b;
gspn cbctd jtdjodf up dpm jdmqgqbjupot/Bn Ktqpt N fe 3111-48,336-:-3383/
- 23/ Ibm N-Cboe QB-N fjmjg SK-ib/sbx j MN -Dbsepof EB/Qrbuifmuf.sjii qibtn b; dvssfou
dpoqfut boe bqmjbjupo jo taptst n fejpf/KBn Bdbe Psuipq Tvsh 3111-28,713-
719/
- 24/ X ftftmuvif sfmjcjiz boe wbjjejz pgqbjp ui stiptne n fbtvshf fou jo ptufpbau sjij
pgui f loff/Tdboe KSifvn bupm2: :6-35,349-353/
- 25/ Spift OD-N bvetfz SI /sbejmuovo fntzoespn f; stfjubou ufoot fntpx bt b ofswf
fousbgn fou/KCpof IbjouTvsh Cs2: 83-65,5: :619/
- 26/ X bsn K-LptjotlijN -Lfmfis TB/B 23.jfn tipasupsn ifbmi tvswfz; dptotusdrijo
pg tdkmt boe qsmjnj jobsz utft pg sfmjcjiz boe wbjjejz/N fe Dbsf 2: :745;
331-344/
- 27/ N bsjbjm N-O-N bsjbj{ {j B -Dbsj1 T-Uspwbp V-Cjodij B -E fobsp W/Qrbuifmuf.sjii
qibtn b jokfdajpot gsp dispoj qrboubs gtdajjut/bu Psuipq 3124-48,94,-:953/
- 28/ Blebi jo E-EphsvzpmE -ZvltfmI Z-I bzb P-Ephbo P-Dmfcfjm-fubm/Uif dpm qbsjtpo pg
ui f fggfdupg dpoqfut boe qrbuifmuf.sjii qibtn b QSO* gsp uif usfbuou foupgmbo.
ubs gtdajjut/Bsd Psuipq Usbn b Tvsh 3123-243,892-896/
- 29/ Lbndj B -Dblj1 I -I bzb P-ZbobiBO -Ephsn bdz J-Tfwjd UU/Usfbuou foupg qrboubs
gtdajjut vtjoh gvsse jgsfouwpdmjokfdajpo n pebjnjfjt; b sbopen j{fe qspqfdajwf djo.
jdmusjy/KBn QpebusN fe Btpd 3111-:::219-224/
- 30/ Mff UH-Bin be UT/Jusbrftjpo bnmvupphpvt cippe jokfdajpo dpm qbsfe up dpaqjptuf.
spje jokfdajpo gsp usfbuou foupg dpm qrboubs gtdajjut/B qspqfdajwf-sbopen j{fe
dpoospme usjbn/GppuBolmf Ju 3118-39,:95-:1/
- 31/ Mpqf{ ,Hbjwjp F-Hpn f{ Dbsj1 MB-Qbss.Ufmf{ Q-Wb{rvf{.Ftdan jib V/Qrbuifmuf.sjii
qibtn b gsp n bobjhj dhdbofvt ufoepo ufoejpgbui z boe qrboubs gtdajjut'/Bdib
PsqfegjibN fy 3122-36,491-496/
- 32/ Shbnc FN T-Piun bo BN B/Qrbuifmuf sjii qibtn b gsp usfbuou foupgdspo j{qrboubs gtdaj.
jijt/Bsd Psuipq Usbn b Tvsh 3123-243,2176-2181/
- 33/ P N bmfz N-K-Wpttfnfs IU-Hv Z/Tvddfttgw vtf pg qrbuifmuf.sjii qibtn b gsp dispoj
qrboubs gtdajjut/I TT K3124-:23,:244/
- 34/ Lj1 F-Mff Kl /Bvupphpvt qrbuifmuf.sjii qibtn b wftvt efyuspt qspqpuif sbsqz gsp uif
usfbuou foupgdspo j{fe sfdbmjsbou qrboubs gtdajjut/QN S 3125-7,263-269/