

**Allengers**  
Passion for excellence

HF C-Arm

**Rollscan**

Discover The Power of .....  
..... 1K x 1K Imaging Technology



**APPLICATIONS :**

- Spinal Surgeries.
- DHS - Dynamic Hip Screw.
- Arthroscopy / Arthroplasty.
- ORIF - Open Reduction Internal Fixation.
- MUA - Manipulation Under Anesthesia is indicated for Total Knee Arthroplasty (TKA) patients.

**ALLENGERS ADVANTAGE - ALL UNDER ONE ROOF**

- Mobile DR Systems • Fixed DR Systems • X-Ray Systems • Cathlabs • C-Arm Image Intensifiers • Mammography
- DSA Systems • Lithotripter • Remote Controlled RF Table • OPG • Monitors • TMT • ECG • EMG • PSG • EEG • HMS • PACS

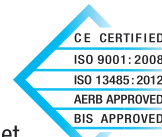
**ALLENGERS MEDICAL SYSTEMS LTD.**

S.C.O. 212-213-214, Sector 34-A, Chandigarh -U.T. 160 022 (INDIA)

DOMESTIC SALES : Ph : +91 172 6618000-99 Fax : +91 172 2621913 marketing@allengers.net  
INTERNATIONAL SALES : Ph : +91 172 6618081, 6618082 Fax : +91 172 2621912 exports@allengers.net

www.allengers.com

TOLL FREE NO. 1800-266-8800 (INDIA)



**10,000+ C-Arms**  
Highest in The Industry



JOURNAL OF ARTHROSCOPY AND JOINT SURGERY

# JAJ

Official Journal of the International Society for Knowledge for Surgeons on Arthroscopy and Arthroplasty (ISKSA)

**Indexed In Scopus & Embase**

**Volume 4 Number 1 January–April 2017**

**ISSN: 2214-9635**

Available online at [www.sciencedirect.com](http://www.sciencedirect.com)

**ScienceDirect**

JAJ

VOLUME 4

NUMBER 1

JANUARY-APRIL 2017

PAGES 1-54

ELSEVIER





International Society for Knowledge for Surgeons  
on Arthroscopy and Arthroplasty

ISKSAA (International Society for Knowledge for Surgeons on Arthroscopy and Arthroplasty) is a society of orthopaedic surgeons from around the world to share and disseminate knowledge, support research and improve patient care in Arthroscopy and Arthroplasty. We are proud to announce that ISKSAA membership is approaching the **1400** mark ( India & Overseas ) making it the **fastest growing Orthopaedic Association in the country** in just over 4 years of its inception . With over **240000 hits from over 144 countries** on the website [www.isksaa.com](http://www.isksaa.com) & more and more interested people joining as members of ISKSAA, we do hope that ISKSAA will stand out as a major body to provide opportunities to our younger colleagues in training, education and fellowships.

#### Our Goals.....

- To provide health care education opportunities for increasing cognitive and psycho-motor skills in Arthroscopy and Arthroplasty
- To provide CME programs for the ISKSAA members as well as other qualified professionals.
- To provide Clinical Fellowships in Arthroscopy and Arthroplasty
- To provide opportunities to organise and collaborate research projects
- To provide a versatile website for dissemination of knowledge

#### ISKSAA Life Membership

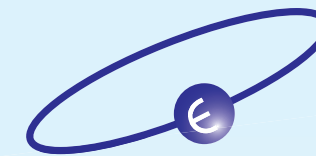
The membership is open to Orthopaedic Surgeons, Postgraduate Orthopaedic students and Allied medical personal interested in Arthroscopy & Arthroplasty.

#### Benefits of ISKSAA Life membership include....

- Eligibility to apply for **ISKSAA's Prestigious Fellowship Programme** . We are finalising affiliations with ESSKA , ISAKOS , BOA , BASK , Wrightington and FLINDERS MEDICAL CENTRE , IMRI AUSTRALIA to provide more **ISKSAA Fellowships** in India , UK , USA , Australia and Europe . **We awarded 14 ISKSAA Fellowships in Feb 2013 , 6 ISKSAA IMRI fellowships in Feb 2014 , 54 ISKSAA fellowships in September 2014 , 22 ISKSAA wrightington MCh fellowships in December 2014 , 40 ISKSAA Fellowships in October 2015 , 15 ISKSAA Wrightington MCh Fellowships in December 2015 and 61 ISKSAA Fellowships in November 2016 .**
- Free Subscription** of ISKSAA's official , SCOPUS INDEXED , EMBASE INDEXED peer reviewed , online scientific journal **Journal of Arthroscopy and Joint Surgery ( JAJS )** .
- Only as a life member , you can enjoy the benefit of **reduced Congress charges** in **ISKSAA Conferences and participate in the Cadaveric workshops .**
- Member's only section** on the website which has access to the conference proceedings and live surgeries of ISKSAA 2012 , 2013 & 2014 along with a host of other educational material .
- Important opportunity for interaction with world leaders in Arthroscopy & Arthroplasty .
- Opportunity to participate in ISKSAA courses and workshops

To enjoy all the benefits & privileges of an ISKSAA member, you are invited to apply for the Life membership of ISKSAA by going to the membership registration section of the website and entering all your details electronically. All details regarding membership application and payment options are available ([www.isksaa.com](http://www.isksaa.com))

Now disperse away worries of compliance from your patient's life  
with a better and faster recovery with



## DISPERZYME<sup>®</sup>

Trypsin B.P. 96mg, Bromelain 180mg, Rutoside Trihydrate B.P. 200mg

**Dispersible tablets**

*The only brand with German Technology*

## Advanced technology

Each particle is enteric coated thus passes safely through stomach and gives maximum intestinal absorption and bioavailability

### For edema and inflammation in<sup>1</sup>

|                             |
|-----------------------------|
| Trauma                      |
| Post operative inflammation |
| Cellulitis                  |
| Wound healing               |

### For soft tissue and sport injuries<sup>2,3</sup>

Reduces pain and inflammation and helps in faster recovery from

|                 |                 |          |
|-----------------|-----------------|----------|
| Tendonitis      | Spondylopathies | Sprains  |
| Frozen shoulder | Contusions      | Bursitis |

## From pioneers of systemic enzyme therapy in India

#### Sources:

[1] D.N.Savant, H.K.Parkh, G.V.Dafary, Efficacy and tolerability of phlogenzym in controlling postoperative inflammation in patients undergoing major surgical resection and reconstruction for head and neck malignancies, Prospective randomized, open, phase III clinical trial, Tata memorial hospital, Mumbai 400012 [2] Rhan H. D., Treatment of ankle distortion with Phlogenzym (1992) [3] Baumüller M, The use of hydrolytic enzymes in blunt soft tissue injuries and ankle distortion, General Medicine 19 (1990), 178.



Office:  
81/A, Mittal Chambers,  
Nariman Point, Mumbai 400 021  
Maharashtra.



## Super-Vim Suture Anchor

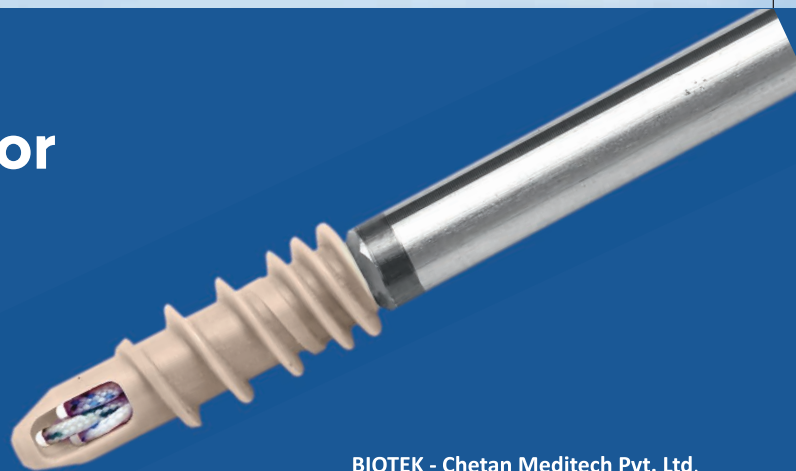
**BAS-9002.50F Super-Vim Suture Anchor,  
Dia. 5.0mm, Titanium (Loaded with two pc Biofiber), Sterile**

- Ideal for mini-open rotator cuff repair procedures
- Anchors made of Ti 6Al-4V ELI Titanium Alloy
- Multiple Biofibers dispense load over more of the tendon
- Independent Biofiber channels reduce suture binding
- Needlepoint tip permits atraumatic hand insertion through soft tissue
- Anchor's wide threads and small core optimize bone purchase
- Fully-threaded anchor body increases resistance to pull-out
- Laser etched markings on the drivers for insertion depth and suture orientation

## Vim-Fix PK Suture Anchor

**BAS-9091.55F Vim-Fix PK III Suture Anchor,  
Dia. 5.5mm (Loaded with three pc Biofiber), Sterile**

- Clinical used for primary or medial row fixation
- Fully threaded; Cancellous and cortical threads provide exceptional fixation strength
- Broaching punch minimizes cortical stress fractures
- Double or triple loaded with Biofiber suture
- Enhanced tip thread profile for easy insertion
- Provides initial fixation strength and stability
- Technique-create hole, screw-in anchor



**BIOTEK - Chetan Meditech Pvt. Ltd.**

Opp. V. S. Hospital, Ellisbridge,  
Ahmedabad-380 006. Gujarat, INDIA.

Phone: +91 79 26578092 Fax: +91 79 26577639

Email: [info@biotekortho.com](mailto:info@biotekortho.com)

[www.biotekortho.com](http://www.biotekortho.com)





# UNIDRIVE® S III ARTHRO

Your All-In-One Solution for Arthroscopy



ART 62/06/2012/A-E

**STORZ**  
KARL STORZ — ENDOSKOPE

THE DIAMOND STANDARD

KARL STORZ GmbH & Co. KG, Mittelstraße 8, 78532 Tuttlingen/Germany, Phone: +49 (0)7461 708-0, Fax: +49 (0)7461 708-105, E-Mail: info@karlstorz.de  
KARL STORZ Endoscopy America, Inc, 2151 E. Grand Avenue, El Segundo, CA 90245-5017, USA, Phone: +1 424 218-8100, Fax: +1 800 321-1304, E-Mail: info@ksea.com  
KARL STORZ Endoscopia Latino-America, 815 N. W. 57 Av., Suite No. 480, Miami, FL 33126-2042, USA, Phone: +1 305 262-8980, Fax: +1 305 262-89 86, E-Mail: info@ksela.com  
KARL STORZ Endoscopy Canada Ltd., 7171 Millcreek Drive, Mississauga, ON L5N 3R3, Phone: +1 905 816-4500, Fax: +1 905 858-4599, E-Mail: info@karlstorz.ca  
[www.karlstorz.com](http://www.karlstorz.com)



## ISKSAA – Wrightington International Training Fellowships leading to MCh degree

We are proud to provide this unique opportunity for post-graduate education and subspecialist training in the UK in partnership with Edge Hill University since 2014 . Around 30 ISKSAA members so far have succeeded in obtaining positions through this program in the UK .

The programme is aimed at motivated candidates who wish to come to UK to obtain 2 years of clinical experience, specialist surgical training and an MCh degree from Wrightington Hospital and Edge Hill University. The next Interview dates will be slated for November / December 2017 and details will be sent to all ISKSAA members once they are finalized .

**Having cleared the IELTS exam** before the interviews will be of advantage for final selections . The Clinical posts would start in August 2018 .

For further details ,

You may visit the website at [http://isksaa.com/isksaa\\_Wrightington\\_MCh\\_Fellowship.php](http://isksaa.com/isksaa_Wrightington_MCh_Fellowship.php) or you may communicate with ISKSAA President at [isksaafellowships@gmail.com](mailto:isksaafellowships@gmail.com).



# COLLAFLEX®

Body's Own **Kind of Collagen**



## In Osteoarthritis,

In patients presenting...

- Morning stiffness <30 minutes
- No crepitus
- Knee pain

Classified as GRAS<sup>1</sup>

Powered  
with  
**FORTIGEL®**



Just one  
sachet a day  
for minimum  
3 months

1. (Generally Recognized As Safe) As accessed on 20th July '12; <http://www.fortigel.com>.  
#. IMS, OCT'15 Rx Audit (amongst plain Bioactive Collagen Peptide brands)

# COLLAFLEX<sup>®</sup> PRO

Promotes Cartilage Health, Supports Mobility



## In Osteoarthritis,

In patients presenting...

- 🕒 Morning stiffness > 30 minutes
- 👉 Difficulty in climbing stairs
- 👂 Fine crepitus
- 🦵 Knee pain

Powered  
with  
FORTIGEL<sup>®</sup>

Just one  
sachet a day  
for minimum  
3 months



SANOFI

Sanofi India Ltd. Sanofi House, CTS No. 117-B,  
L&T Business Park, Saki Vihar Road, Powai, Mumbai 400072.





# Over Four Centuries of Publishing Experience!

With deep roots in health sciences publishing, Elsevier helps doctors advance practice of medicine by providing world-class information which helps them make critical decisions and improve patient outcomes.

Elsevier brings to you over 2,000 health sciences journals, and works with over 7,000 journal editors, 70,000 editorial board members, 300,000 reviewers and 600,000 authors. As the world's leading publisher of science and health information, Elsevier brings to you knowledge products including:

- *The Lancet*
- *The Clinics of North America*
- *Gray's Anatomy*
- *Nelson's Pediatrics*
- *Dorland's Illustrated Medical Dictionary*
- *Netter's Atlas of Human Anatomy*

## Leading Indian Journals from the House of Elsevier



For advertisement and subscription enquiries in Elsevier journals, please write to

[indiacontact@elsevier.com](mailto:indiacontact@elsevier.com)



# Journal of Arthroscopy and Joint Surgery

An official publication of International Society for Knowledge for Surgeons on Arthroscopy and Arthroplasty

(ISSN: 2214-9635)

Volume 4, Number 1, January–April 2017

## Aims and Scope

*Journal of Arthroscopy and Joint Surgery* (JAJS) is committed to bring forth scientific manuscripts in the form of original research articles, current concept reviews, meta-analyses, case reports and letters to the editor. The focus of the Journal is to present wide-ranging, multi-disciplinary perspectives on the problems of the joints that are amenable with Arthroscopy and Arthroplasty. Though Arthroscopy and Arthroplasty entail surgical procedures, the Journal shall not restrict itself to these purely surgical procedures and will also encompass pharmacological, rehabilitative and physical measures that can prevent or postpone the execution of a surgical procedure. The Journal will also publish scientific research related to tissues other than joints that would ultimately have an effect on the joint function.

## Author inquiries

You can track your submitted article at <http://www.elsevier.com/track-submission>. You can track your accepted article at <http://www.elsevier.com/trackarticle>. You are also welcome to contact Customer Support via <http://support.elsevier.com>

## Copyright

© 2017, International Society for Knowledge for Surgeons on Arthroscopy and Arthroplasty. Published by Reed Elsevier India Pvt. Ltd. All rights reserved. Papers accepted for publication become the copyright of *International Society for Knowledge for Surgeons on Arthroscopy and Arthroplasty*, and authors will be asked to sign a transfer of copyright form, on receipt of the accepted manuscript by Elsevier. This enables the Publisher to administer copyright on behalf of the Authors, whilst allowing the continued use of the material by the Author for scholarly communication.

**This journal and the individual contributions contained in it are protected under copyright by Elsevier Ltd., and the following terms and conditions apply to their use:**

## Photocopying

Single photocopies of single articles may be made for personal use as allowed by national copyright laws. Permission of the Publisher and payment of a fee is required for all other photocopying, including multiple or systematic copying, copying for advertising or promotional purposes, resale, and all forms of document delivery. Special rates are available for educational institutions that wish to make photocopies for non-profit educational classroom use.

For information on how to seek permission visit <http://www.elsevier.com/permissions> or call: (+44) 1865 843830 (UK) / (+1) 215 239 3804 (USA).

## Derivative Works

Subscribers may reproduce table of contents or prepare lists of articles including abstracts for internal circulation within their institutions. Permission of the Publisher is required for resale or distribution outside the institution. Permission of the Publisher is required for all other derivative works, including compilations and translations (please consult [www.elsevier.com/permissions](http://www.elsevier.com/permissions)).

## Electronic Storage or Usage

Permission of the Publisher is required to store or use electronically any material contained in this journal, including any article or part of an article (please consult [www.elsevier.com/permissions](http://www.elsevier.com/permissions)).

Except as outlined above, no part of this publication may be reproduced, stored in a retrieval system or transmitted in any form or by any means, electronic, mechanical, photocopying, recording or otherwise, without prior written permission of the Publisher.

## Notice

No responsibility is assumed by the Publisher for any injury and/or damage to persons or property as a matter of products liability, negligence or otherwise, or from any use or operation of any methods, products, instructions or ideas contained in the material herein. Because of rapid advances in the medical sciences, in particular, independent verification of diagnoses and drug dosages should be made.

Although all advertising material is expected to conform to ethical (medical) standards, inclusion in this publication does not constitute a guarantee or endorsement of the quality or value of such product or of the claims made of it by its manufacturer.

## Subscription information

The *Journal of Arthroscopy and Joint Surgery* (ISSN: 2214-9635) is published thrice a year. The annual price for **individual subscription** based in India is **INR 3600**; and for international subscribers, the annual price is **USD 60**. For **institutional subscription** within and outside India, please contact the Publishers office at [journals.india@elsevier.com](mailto:journals.india@elsevier.com).

Further information is available on this journal and other Elsevier products through Elsevier's website (<http://www.elsevier.com>). Subscriptions are accepted on a prepaid basis only and are entered on a calendar year basis. Issues are sent by standard mail. Priority rates are available upon request. Claims for missing issues should be made within six months of the date of dispatch.

**Orders, claims, advertisement and journal enquiries:** please contact

**Editorial Office:** Dr Pushpinder Singh Bajaj, Bajaj Specialist Clinics, B-7/5 Safdarjung Enclave, New Delhi – 110029. Tel: 41057555 / 41057556 / 41057557. Email: [psbajaj@hotmail.com](mailto:psbajaj@hotmail.com).

**Publishing Office:** Elsevier, A division of Reed Elsevier India Pvt. Ltd., 14th Floor, Building No.10B, DLF Cyber City, Phase-II, Gurgaon-122002, Haryana, India. Email: [journals.india@elsevier.com](mailto:journals.india@elsevier.com)



# Journal of Arthroscopy and Joint Surgery

An official publication of International Society for Knowledge for Surgeons on Arthroscopy and Arthroplasty

(ISSN: 2214-9635)

Volume 4, Number 1, January–April 2017

## Editor-in-Chief

PROF RAVI GUPTA Chandigarh

MR SANJEEV ANAND UK

## Executive Editor

PROF LALIT MAINI Delhi

## Managing Editor

DR PUSHPINDER BAJAJ Delhi

## Deputy Editor

DR AMITE PANKAJ Delhi

## Section Editors

### Trauma & Rehabilitation

DR ALEXANDER WOOD UK

### Hip

DR AJAY AGGARWAL USA

### Foot & Ankle

DR MUNEEESH BHATIA UK

### Training & Education

DR JANAK MEHTA Australia

### Arthroplasty

DR MANOJ SOOD UK

### Pediatric Orthopaedics

DR PARMANAND GUPTA Chandigarh

### Orthopaedic Oncology

DR MANISH PARUTHI Mumbai

### Elbow, Wrist & Hand

DR RAJ MURALI UK

### Shoulder

DR AMOL TAMBE UK

## Associate Editors

DR DINESH PATEL USA  
DR PONKY FIRER South Africa

PROF JEGAN KRISHNAN Australia  
DR GURINDER BEDI Delhi

DR RAJESH SETHI UK  
DR DINSHAW PARDIWALA Mumbai

## Editorial Board

PROF GIANNOUDIS UK  
PROF AMAR RANGAN UK  
DR KHALID MOHAMMAD New Zealand  
MR KAPIL KUMAR UK  
DR MAKARAM SRINIVASAN UK

DR V BHALAIK UK  
DR PUNEET MONGA UK  
DR TAOFECK ADEYEMI Nigeria  
DR MS DHILLON Chandigarh  
DR VIVEK PANDEY Karnataka

DR SUNDARARAJAN Coimbatore  
DR ASHISH DEVGAN Rohtak  
DR RAJU EASWARAN Delhi  
DR RAHUL KHARE Delhi  
DR MANIT ARORA

## Advisory Board

DR ANDREAS SETTJE Germany  
DR ANANT JOSHI Mumbai  
DR ASHOK RAJGOPAL Gurgaon  
DR ASHISH BABULKAR Pune  
DR ASIT SHAH USA  
DR ANIL BHAT Karnataka  
MR BINOD SINGH UK  
DR BINU THOMAS Tamil Nadu  
DR DAVID MARTIN Australia  
DR DAVID RAJAN Coimbatore  
DR DENNY LIE Singapore  
DR EDWARD T MAH Australia  
DR GRAHAM MERCER South Australia  
DR H K WONG Hong Kong

DR HIROYUKI SUGAYA Japan  
DR HITESH GOPALAN Cochin  
PROF J E MENDES Portugal  
DR JAAP WILLEMS Holland  
DR JOHN EBNEZAR Bangalore  
DR JVS VIDYASAGAR Hyderabad  
PROF LENNARD FUNK UK  
DR MARIO PENTA South Australia  
DR NICK WALLWORK South Australia  
DR NIRBHAY SHAH Rajkot  
DR PAOLO PALADINI Italy  
DR PARAG SANCHETI Pune  
DR PETER CAMPBELL Australia  
PROF PP KOTWAL Delhi

PROF RAJASEKARAN Coimbatore  
MR RAM VENKATESH UK  
MR R PANDEY UK  
PROF RAJ BAHADUR Chandigarh  
MR ROBERT J GREGORY UK  
DR ROHIT ARORA Austria  
DR SACHIN TAPASVI Pune  
DR SANJAY DESAI Mumbai  
DR SANJAY GARUDE Mumbai  
DR SANJAY TRIVEDI Ahmedabad  
DR SRIPATHI RAO Karnataka  
PROF SUDHIR KAPOOR Delhi  
MR VED GOSWAMI UK  
DR YOUNG LAE MOON Korea

Copyright (C) 2017, International Society for Knowledge for Surgeons on Arthroscopy and Arthroplasty. All rights reserved.

Published by Reed Elsevier India Pvt. Ltd.

No part of the publication may be transmitted in any form or by any means, electronic or mechanical, without written permission from the Editor-in-Chief.

*Disclaimer: Although all advertising material is expected to conform to ethical (medical) standards, inclusion in the publication does not constitute a guarantee or endorsement of the quality or value of such product or of the claims made of it by its manufacturer. Please consult full prescribing information before issuing prescriptions for any products mentioned in this publication.*

Printed at EIH Limited-Unit Printing Press, IMT Manesar, Gurgaon





# Journal of Arthroscopy and Joint Surgery

An official publication of International Society for Knowledge for Surgeons on Arthroscopy and Arthroplasty

(ISSN: 2214-9635)

Volume 4, Number 1, January–April 2017

## Table of Contents

|                                                                                                                                                                                                                                                  |    |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|
| Indian Orthopaedic surgeons are less burned out than their Western colleagues<br><i>Sunil H. Shetty, Yusuf Assem, Ravindra G. Khedekar, Stephen Asha, Mani Arora</i>                                                                             | 1  |
| Dimensions of distal femur in terms of total knee arthroplasty among different origins – A systematic review<br><i>Surabhi Rohilla, Ruurd Jaarsma, Lalit Maini, Raechel Damarell, Govind Mawari, Jegan Krishnan</i>                              | 8  |
| Quadriceps sparing (subvastus/midvastus) approach versus the conventional medial parapatellar approach in primary knee arthroplasty<br><i>Nitin Mehta, Mohd Shafi Bhat, Ankit Goyal, Pallav Mishra, Deepak Joshi, Deepak Chaudhary</i>           | 15 |
| Comparing gait analysis and functional outcomes of short femoral metaphyseal stem and high functional hip arthroplasty (resurfacing and big femoral head): A pilot study<br><i>P.K. Karampinas, J.A. Vlamis, E.G. Papadelis, Sp. Pneumaticos</i> | 21 |
| Functional outcome of arthroscopic repair of full-thickness degenerative rotator cuff tears<br><i>Amresh Ghai, C.M. Singh, Munish Sood, Sunit Kumar S. Wani</i>                                                                                  | 27 |
| Functional outcome of partial arthroscopic repair for massive rotator cuff tears<br><i>R. Badge, J.A. Baxter, P. Monga</i>                                                                                                                       | 31 |
| A method of avoiding skin irritation from outside-in suture knots in wrist scope surgery<br><i>Hui-Kuang Huang, Fang-Chieh Lien, Wei-Hsing Chih</i>                                                                                              | 36 |
| Dermal burn: An unusual complication of radio frequency probe in shoulder arthroscopy<br><i>Deepak Chahar, Ankit Chawla, Nikhil Verma, Anurag Mittal, Amite Pankaj</i>                                                                           | 38 |
| Recurrent intraarticular knee hemangiomas: A case report<br><i>George Mathew Srampickal, Korula Mani Jacob, Koyeli M. Mahata</i>                                                                                                                 | 41 |
| Spontaneous bilateral quadriceps rupture – A case report<br><i>Deepak Chahar, Ravi Sreenivasan, Ankit Chawla, Nikhil Verma, Devendra Pathrot, Amite Pankaj</i>                                                                                   | 45 |
| Total hip arthroplasty in neglected, obturator type, hip dislocation in a young adult – an unusual case and literature review<br><i>Sandeep Patel, Ranganatha B. Thimmegowda, Rakesh John, T.R. Sunil Kumar, R.H.H. Arjun</i>                    | 50 |





## Research paper

## Indian Orthopaedic surgeons are less burned out than their Western colleagues



Sunil H. Shetty<sup>a,c</sup>, Yusuf Assem<sup>b,c</sup>, Ravindra G. Khedekar<sup>a,c</sup>, Stephen Asha<sup>c,d</sup>,  
Manit Arora<sup>a,c,\*</sup>

<sup>a</sup> Department of Orthopaedics, Padmashree Dr D.Y. Patil Hospital and Research Centre, Navi Mumbai, India

<sup>b</sup> Prince of Wales Clinical School, University of New South Wales, Australia

<sup>c</sup> University of New South Wales, Australia

<sup>d</sup> Department of Emergency Medicine, St George Public Hospital, Sydney, Australia

## ARTICLE INFO

## Article history:

Received 30 April 2016

Accepted 20 March 2017

Available online 7 April 2017

## Keywords:

Burnout

Stress

MBI

Orthopaedics

Surgeons

Doctors and physicians

## ABSTRACT

**Background:** Burnout is a tridimensional psychological syndrome, the consequences of which in surgeons can be devastating. A preliminary review of the literature has demonstrated a paucity of validated studies measuring the levels of surgeon burnout throughout Asia. The purpose of this paper was to assess the prevalence and factors associated with burn out in Indian orthopedic surgeons and compare them to their western colleagues.

**Materials & methods:** This nationwide cross-sectional study was conducted at the Indian Orthopaedic Association Annual Meeting, via a validated burnout assessment instrument. Variables were compared using the chi-square, Mantel-Haenszel and Mann-Whitney-U tests. Variables associated with burnout subscales and overall burnout were explored using multiple linear and logistic regression.

**Results:** There were 299 responses to the survey, 23.1% of the surgeons were allocated burnout status. There was a significant ( $p < 0.001$ ) association between burnout, all measures of satisfaction and health. This association also existed for half-days in public practice ( $p = 0.03$ ) and marital status ( $p < 0.001$ ).

**Conclusion:** This is the first study to assess burnout among orthopedic surgeons in Asia. The use of a validated instrument facilitates future cross study comparisons. There were low levels of burnout in the Indian orthopedic profession, when compared to western countries, albeit a variety of sociocultural factors may play a role. There was evidence to suggest that the number of half-day sessions per week in public practice was associated with burnout, possibly attributed to longer hours and less flexibility. Satisfaction with training pathway was consistently significantly associated with all burnout subscales, a focus for future interventions. A strongly significant association persisted with our previous Australian study between burnout and marital status, emotional support and family stability critical for burnout minimization.

© 2017 Published by Elsevier, a division of RELX India, Pvt. Ltd on behalf of International Society for Knowledge for Surgeons on Arthroscopy and Arthroplasty.

## 1. Introduction

Burnout is a tridimensional psychological syndrome of emotional exhaustion, inter-personal depersonalization and a reduced self-evaluation of accomplishment.<sup>1</sup> Doctors and other allied health professionals are especially susceptible to burnout, when compared to the general population.<sup>2</sup> This was suggested as an “inevitable consequence” of the maladaptive adaptation to the

demands of working in the health care system.<sup>3</sup> The long hours, emotional patient interactions and high-pressure environment, responded to with low prioritization of self-care and denial of individuals own emotions.<sup>4,5</sup>

The principal symptoms of burnout in doctors are the objectification of patients and colleagues, emotional and physical exhaustion, poor judgment, cynicism and depersonalization in relationships.<sup>2</sup> Burnout in doctors, particularly surgeons is of critical importance as the consequences can be devastating for the individual, patients and institution.<sup>6</sup> Orthopedic surgeons were placed in the top five most burnout specialties when compared with other doctors and hospital staff.<sup>7</sup>

\* Corresponding author at: Department of Orthopaedics, Padmashree Dr D.Y. Patil Hospital and Research Centre, Navi Mumbai, India.

E-mail address: [manit\\_arora@hotmail.com](mailto:manit_arora@hotmail.com) (M. Arora).



A review of burnout<sup>7</sup> described the consequences for doctors to include emotional and physical illness, reduced satisfaction, drug abuse and poor health (such as hypertension, sleep disturbance and myocardial infarction). Manifesting institutionally as poor performance, increase turnover and medical errors and associated deficits in quality of medical care and safety for patients.

Previously the prevalence of burnout in surgeons has been reported as 30–38% and 50–60% in orthopedic surgeons, compared to 28% in throughout the general US working population.<sup>2,7</sup> This was found to be consistently higher in residents and trainees.<sup>7</sup> Our team has found that 53% of Australian orthopaedic trainees were burned out.<sup>2</sup> Analyzing the positive or negative association between work-related (including career position and satisfaction with work-life balance) and non-work-related (demographic data) factors with burnout.<sup>2</sup> A preliminary review of the literature has demonstrated a paucity of validated studies measuring the levels of burnout in doctors throughout Asia and the sub-continent. This study is the first to assess the prevalence and factors associated with burn out in Indian orthopedic surgeons.

## 2. Methods

### 2.1. Design, participants and setting

This nationwide cross-sectional study was conducted at the Indian Orthopaedic Association Annual Meeting, in December 2013. A hard copy survey was distributed to attendees throughout each session and completed forms collected at the end of each session. 2200 copies of the survey were distributed and there were 299 responses. All participants had complete data pertaining to burnout assessment. Ethics approval was obtained from the 'Institutional Ethics Approval of Dr. D.Y. Patil Hospital and Research Centre'.

### 2.2. Data collection

In November 2013 a pilot survey was trialed by 10 consultants at our institution, assessing the overall ambiguity, comfort and feasibility of questions. Preliminary feedback was satisfactory and no modifications were made. The survey was divided into two sections; a self-developed questionnaire and a validated burnout assessment tool.

The self-developed questionnaire assessed a variety of work related and non-work related factors potentially associated with burnout (Table 2). It comprised of 12 questions related to participant demographics, four items measuring satisfaction with career, work-life balance, income and training pathway and a subjective self-assessment of overall health (adapted from the short-form-health survey – SF-36).<sup>2,8</sup>

The Maslach Burnout Inventory (MBI)–Human Services Survey was the validated burnout assessment instrument of choice. It consists of three subscales and corresponding dimensions: nine items quantifying emotional exhaustion (stress dimension), five items measuring depersonalization (interpersonal context dimension) and eight items calculating personal achievement (self evaluation dimension).<sup>1,6</sup>

### 2.3. Statistical analysis

The overall scores of participants in each subscale were categorized into low, medium and high levels of burnout, subject to a priori guidelines by MindGarden Inc. (Menlo Park, CA, USA). A correlation exists between burnout and high levels of emotional exhaustion and depersonalization, albeit personal achievement is inversely proportional. Consistent with previous studies, we have defined participant burnout as high emotional exhaustion or depersonalization subscale scores (Table 1).<sup>2</sup>

Characteristics of participants were first analysed according to final burnout status (Table 2). Nominal categorical variables were presented as proportions and compared using the chi-square test. Ordered categorical variables with >2 categories (age, current position, years worked as an orthopaedic surgeon, half-day sessions per week in public practice, half-day sessions per week in private practice, income bracket compared to peers in orthopaedic surgery) were analysed for evidence of a trend for increasing or decreasing proportions of the outcome from the first to the last category using the Mantel-Haenszel test for trend. Where a trend was confirmed this was then tested for significant departures from the observed trend. All continuous variables were non-normally distributed. These variables were presented as medians with inter-quartile ranges (IQR), and compared using the Mann-Whitney-*U* test.

Variables associated with each of the three-burnout subscales were explored using multiple linear regression. Variables evaluated are listed in Table 4. The univariate association between each of the three burnout subscales and these variables was first explored using simple linear regression. Dummy variables were created for categorical variables with more than 2 categories. Those variables whose association with the subscale had a  $p < 0.20$  were then included in the multivariate model. Using stepwise backward elimination, variables were removed until only variables with  $p < 0.05$  remained in the model.

Variables associated with burnout were explored using logistic regression. Those variables whose univariate association with burnout had a  $p < 0.20$  were then included in the multivariate model. Using stepwise backward elimination, variables were removed until only variables with  $p < 0.05$  remained in the model. Variables that had a significant association with burnout after controlling for the confounding effect of other variables are presented in Table 6. All analyses were conducted using IBM SPSS Statistics v21 (IBM Corp, Armonk, New York, USA). *P* values of  $< 0.05$  were considered statistically significant.

## 3. Results

There were 299 (13.6%) responses from the 2200 copies of the survey distributed. Overall 15%, 17% and 38% of participants scored high levels of emotional exhaustion, depersonalization and low personal accomplishment respectively; resulting in 69 (23.1%) of the surgeons allocated a burnout status (Table 1).

The association between burnout status and participant demographics is illustrated in Table 2. There was a significant ( $p < 0.001$ ) association between burnout and all measures of satisfaction and health. This association also existed for half-days

**Table 1**  
Rates of various levels for each subscale of the MBI – Human Services Survey.

| Subscales of the Maslach Burnout Inventory | Low (% of participants) | Level<br>Medium (% of participants) | High (% of participants) |
|--------------------------------------------|-------------------------|-------------------------------------|--------------------------|
| Emotional Exhaustion                       | 0–16 (58)               | 17–26 (27)                          | ≥27 (15)                 |
| Depersonalization                          | 0–6 (48)                | 7–12 (35)                           | ≥13 (17)                 |
| Personal accomplishment                    | ≥39 (38)                | 32–38 (30)                          | 0–31 (32)                |

**Table 2**

Characteristics of participants according to burnout status.

|                                                                                  | Burnout     |             |      |
|----------------------------------------------------------------------------------|-------------|-------------|------|
|                                                                                  | Yes         | No          |      |
| n (%)<br>Total = 299                                                             | 69 (23.1)   | 230 (76.9)  |      |
|                                                                                  | Median(IQR) | Median(IQR) | p    |
| Number of children                                                               | 1 (0–2)     | 1 (0–2)     | 0.26 |
| How would you rate your health<br>(scale 1–5: 1 = poor, 5 = excellent)<br><0.001 | 3 (2–3)     | 3 (3–4)     |      |
| Satisfaction with career<br>(scale 1–5: 1 = low, 5 = high)<br><0.001             | 5 (3–5)     | 5 (4–5)     |      |
| Satisfaction with work-life balance<br>(scale 1–5: 1 = low, 5 = high)<br><0.001  | 2 (2–4)     | 4 (3–4)     |      |
| Satisfaction with income<br>(scale 1–5: 1 = low, 5 = high)<br><0.001             | 2 (2–4)     | 4 (3–4)     |      |
| Satisfaction with training pathway<br>(scale 1–5: 1 = low, 5 = high)<br><0.001   | 2.5 (1–4)   | 4 (3–5)     |      |
|                                                                                  | n (row %)   | n (row %)   | p    |
| Age bracket (years)                                                              |             |             |      |
| 20–29                                                                            | 9 (15)      | 53 (85)     |      |
| 0.21 <sup>a</sup>                                                                |             |             |      |
| 30–39                                                                            | 22 (32)     | 46 (68)     |      |
| 40–49                                                                            | 9 (13)      | 61 (87)     |      |
| ≥50–59                                                                           | 29 (29)     | 70 (71)     |      |
| Sex                                                                              |             |             |      |
| Male                                                                             | 67 (23)     | 219 (77)    |      |
| 0.51 <sup>b</sup>                                                                |             |             |      |
| Female                                                                           | 2 (15)      | 11 (85)     |      |
| Marital status                                                                   |             |             |      |
| Married or Defacto                                                               | 41 (18)     | 181 (82)    |      |
| <0.001                                                                           |             |             |      |
| Never married                                                                    | 19 (31)     | 43 (69)     |      |
| Divorced                                                                         | 9 (60)      | 6 (40)      |      |
| Partner in medical profession                                                    |             |             |      |
| Yes                                                                              | 32 (20)     | 131 (80)    | 0.12 |
| No                                                                               | 37 (27)     | 99 (73)     |      |
| Current position                                                                 |             |             |      |
| Resident/senior resident                                                         | 18 (24)     | 58 (76)     | 0.89 |
| Consultant                                                                       | 24 (20)     | 94 (80)     |      |
| Head of department                                                               | 7 (29)      | 17 (71)     |      |
| Assistant professor/lecturer                                                     | 15 (25)     | 46 (75)     |      |
| Associate/full Professor                                                         | 4 (22)      | 14 (78)     |      |
| Years worked as an Orthopaedic surgeon                                           |             |             |      |
| 0–9                                                                              | 41 (22)     | 144 (78)    |      |
| 0.72 <sup>a</sup>                                                                |             |             |      |
| 10–19                                                                            | 23 (31)     | 51 (69)     |      |
| ≥20                                                                              | 5 (13)      | 33 (87)     |      |
| Practice region                                                                  |             |             |      |
| North India                                                                      | 19 (23)     | 64 (77)     | 0.14 |
| South India                                                                      | 16 (24)     | 52 (76)     |      |
| East India                                                                       | 15 (38)     | 24 (62)     |      |
| West India                                                                       | 15 (19)     | 66 (81)     |      |
| Central India                                                                    | 4 (15)      | 22 (85)     |      |
| Half-day sessions per week in public practice                                    |             |             |      |
| 0–3                                                                              | 21 (19)     | 90 (81)     |      |
| 0.03 <sup>a</sup>                                                                |             |             |      |
| 4–5                                                                              | 16 (22)     | 58 (78)     |      |
| 6–7                                                                              | 4 (15)      | 23 (85)     |      |

Table 2 (Continued)

|                                                           | n (row %) | n (row %) | p    |
|-----------------------------------------------------------|-----------|-----------|------|
| 8 or more                                                 | 28 (34)   | 55 (66)   |      |
| Half-day sessions per week in private practice            |           |           |      |
| 0–3                                                       | 25 (29)   | 60 (71)   |      |
| 0.13 <sup>a</sup>                                         |           |           |      |
| 4–5                                                       | 15 (27)   | 40 (73)   |      |
| 6–7                                                       | 4 (11)    | 31 (89)   |      |
| 8 or more                                                 | 25 (22)   | 90 (78)   |      |
| Income bracket compared with peers in orthopaedic surgery |           |           |      |
| Bottom 25%                                                | 40 (33)   | 80 (67)   |      |
| 0.07 <sup>a</sup>                                         |           |           |      |
| 25–49%                                                    | 10 (13)   | 67 (87)   |      |
| 50–74%                                                    | 10 (16)   | 54 (84)   |      |
| Top 25%                                                   | 9 (29)    | 22 (71)   |      |
| Smoking status                                            |           |           |      |
| Non-smoker                                                | 46 (22)   | 167 (78)  | 0.18 |
| Smoker                                                    | 23 (29)   | 56 (71)   |      |
| Considered leaving the profession in past year            |           |           |      |
| No                                                        | 54 (21)   | 203 (79)  | 0.02 |
| Yes                                                       | 15 (38)   | 24 (62)   |      |

<sup>a</sup> Mantel-Haenszel test for trend.

<sup>b</sup> Chi-square test may not be valid due to expected counts <5 in one or more cells.

in public practice ( $p=0.03$ ) and marital status; 60% of divorcees were burnt out in comparison to burnout in 31% who were never married and 18% who were married or in a de facto relationship ( $p<0.001$ ). 38% of surgeons who had considered leaving the profession in the past year were burnt out, comparative to 21% who had not ( $p=0.02$ ). No other demographic variable was significantly associated to burnout.

### 3.1. Regression modeling

Self-rated health, satisfaction with income, and satisfaction with training pathway were found to have a significant (negative) association with the emotional exhaustion score (Table 4). For each one unit increase in a variable, the emotional exhaustion score fell by the value of the corresponding regression coefficient. This model explains 28% of the variability in the emotional exhaustion score ( $R^2=0.28$ ).

Having a spouse in the medical profession, income bracket, satisfaction with career and satisfaction with training pathway were found to have a significant (negative) association with the depersonalization score (Table 4). For each one unit increase in a variable, the depersonalization score fell by the value of the corresponding regression coefficient. This model explains 19% of the variability in the emotional exhaustion score ( $R^2=0.19$ ).

Satisfaction with training pathway was the only variable found to have a significant association with the personal accomplishment score (Table 4). For each one unit increase in this variable, the personal accomplishment score increased by 1.21 points. This model explains 4% of the variability in the personal accomplishment score ( $R^2=0.04$ ).

The univariate association between variables of interest and burnout via logistic regression are listed in Table 3. Age, marital status, spouse in medical profession, years worked as an orthopedic surgeon, practice region, number of half-day sessions in public or private practice, income bracket, smoker and health status, satisfaction and considering leaving the profession were included in the multivariate analysis ( $p<0.2$  criterion). The only variables with significant association with burnout after controlling for confounding factors of all the other variables were Age

( $p=0.01$ ), marital status ( $p=0.001$ ), income bracket ( $p=0.05$ ), health ( $p<0.001$ ) and satisfaction with training pathway ( $p=0.02$ ) (Table 4).

## 4. Discussion

This is the first study to assess burnout among orthopedic surgeons in India. The use of a validated instrument allows for historical and future cross study, country and occupational comparisons. The results and trends observed in this study may be extrapolated to the surrounding regions with similar socio-demographic and medical institutional contexts.

An unexpected finding identified from the study is the low level of burnout in the Indian orthopedic profession (23.1%), when compared to western countries; Australia (53% of registrars) and USA (50% and 56% for orthopedic surgeons and trainees).<sup>2</sup> This result is consistent with another MBI burnout study in doctors and dentists in North India, who exhibited very low levels of burnout, which is surprising given the high levels of poverty, health care needs, shortage of health professionals and heavy work hours.<sup>9</sup> The reduced burnout may be attributed to three primary factors: Less litigation in India compared to western countries, albeit this trend is changing. More Indian surgeons working in private practice, therefore with more control over their work-life balance.<sup>9</sup> Finally the poor socio-demographic context may influence the self-perception of the burnout subscales, work related stresses dismissed as the norm. Carod-Artal and Vázquez-Cabrera encourage caution however when interpreting the MBI internationally as the values vary, subject to the diverse socio-cultural factors of differing countries. They continue to warn of the negative implications if validation of survey instruments in developing countries is not independent of those in developed countries.<sup>10</sup>

Bhugra et al. concluded that private practice provides surgeons with more control over their professional lives and may be responsible for low levels of burnout.<sup>9</sup> However our study did not demonstrate any significant association with the burnout and the number of half-day sessions in private practice ( $p=0.13$ ). Conversely there was evidence to suggest that the number of half-day sessions per week in public practice was associated with

**Table 3**

Univariate analysis of the association between Burnout subscale and each explanatory variable.

| Explanatory variable                                | p      |
|-----------------------------------------------------|--------|
| Emotional exhaustion                                |        |
| Age                                                 | 0.13   |
| Number of children                                  | 0.30   |
| Marital status                                      | 0.10   |
| Current position                                    | 0.11   |
| Years worked as orthopaedic surgeon                 | 0.63   |
| Spouse in medical field                             | 0.14   |
| Sex                                                 | 0.47   |
| Practice region                                     | 0.74   |
| Number of half-day session/week in public practice  | 0.24   |
| Number of half-day session/week in private practice | 0.66   |
| Income bracket                                      | 0.004  |
| Smoker                                              | 0.16   |
| Self-rated health                                   | <0.001 |
| Satisfaction with career                            | <0.001 |
| Satisfaction with work life balance                 | <0.001 |
| Satisfaction with income                            | <0.001 |
| Satisfaction with training pathway                  | <0.001 |
| Considered leaving the profession                   | 0.001  |
| Depersonalisation                                   |        |
| Age                                                 | 0.71   |
| Number of children                                  | 0.02   |
| Marital status                                      | 0.04   |
| Current position                                    | 0.46   |
| Years worked as orthopaedic surgeon                 | 0.15   |
| Spouse in medical field                             | <0.001 |
| Sex                                                 | 0.36   |
| Practice region                                     | 0.14   |
| Number of half-day session/week in public practice  | 0.67   |
| Number of half-day session/week in private practice | 0.24   |
| Income bracket                                      | <0.001 |
| Smoker                                              | 0.56   |
| Self-rated health                                   | <0.001 |
| Satisfaction with career                            | <0.001 |
| Satisfaction with work life balance                 | 0.01   |
| Satisfaction with income                            | <0.001 |
| Satisfaction with training pathway                  | <0.001 |
| Considered leaving the profession                   | 0.001  |
| Personal accomplishment                             |        |
| Age                                                 | 0.29   |
| Number of children                                  | 0.44   |
| Marital status                                      | 0.67   |
| Current position                                    | 0.08   |
| Years worked as orthopaedic surgeon                 | 0.75   |
| Spouse in medical field                             | 0.19   |
| Sex                                                 | 0.32   |
| Practice region                                     | 0.28   |
| Number of half-day session/week in public practice  | 0.19   |
| Number of half-day session/week in private practice | 0.42   |
| Income bracket                                      | 0.05   |
| Smoker                                              | 0.78   |
| Self-rated health                                   | 0.03   |
| Satisfaction with career                            | 0.76   |
| Satisfaction with work life balance                 | 0.83   |
| Satisfaction with income                            | 0.18   |
| Satisfaction with training pathway                  | <0.001 |
| Considered leaving the profession                   | 0.31   |

burnout. This association took the form of a trend with increasing probability of burnout with increasing number of half-day sessions per week in public practice ( $p=0.03$ ). There were no significant departures from this trend ( $p>0.25$ ). The public sector is more demanding in terms of over time and less flexibility, thus possibly contributing to physician burnout.

Interestingly satisfaction with training pathway was the only variable to have a significant association to personal accomplishment ( $p<0.001$ ) and the other burnout subscales (Table 5). Correspondingly after controlling for confounding variables it

**Table 4**

Multivariate analysis analysis: variables associated each of the Burnout subscales.

|                                    | Regression coefficient | 95%CI       | p      |
|------------------------------------|------------------------|-------------|--------|
| Emotional exhaustion score         |                        |             |        |
| Self-rated health                  | −2.98                  | −4.02–−1.93 | <0.001 |
| Satisfaction with income           | −1.74                  | −2.66–−0.83 | <0.001 |
| Satisfaction with training pathway | −1.80                  | −2.59–−1.00 | <0.001 |
| Depersonalisation score            |                        |             |        |
| Spouse in the medical profession   | −1.8                   | −3.06–0.61  | 0.003  |
| Income bracket                     | −0.97                  | −1.57–−0.38 | 0.001  |
| Satisfaction with career           | −1.10                  | −1.74–−0.47 | 0.001  |
| Satisfaction with training pathway | −0.72                  | −1.20–−0.23 | 0.004  |
| Personal accomplishment            |                        |             |        |
| Satisfaction with training pathway | 1.21                   | 0.54–1.88   | <0.001 |

maintained a significant association with overall burnout ( $p=0.02$ ).

Whereas satisfaction with income was only significantly associated with emotional exhaustion ( $p<0.001$ ). Thus surgeons self evaluation and personal accomplishment stems from factors external to monetary reward. Facilitation of training pathways perceived as less stressful, balanced and fulfilling to its recipients a plausible target to reduce burnout in the surgeons they produce. There is a deficit in the literature exploring the relationship between specific training modalities (independent research tie, professional development, mentorship programs) and burnout in orthopedic surgeons.

Marital status had a strongly significant association with burnout ( $p<0.001$ ). A similar correlation observed by Bhugra et al. was attributed to the Indian context wherein marriage and maintenance of a stable family are exceptionally valued.<sup>9</sup> We found that divorcees were twice as likely (60%) to be burnt out compared to individuals who had never been married (31%) and almost four times as likely as married people (18%). This substantiates the impact emotional turbulence in domestic affairs may have on burnout status. Sargent et al. described positive marital functioning and satisfaction as a powerful protective factor for physician burnout.<sup>11</sup> The provision of emotional support, family stability and a source of stress relief through a harmonious marriage are important factors in reduction of burnout and psychological distress, irrespective of context. However there was no meaningful relationship between having a spouse in the medical field and burnout, though it was significantly associated with depersonalization ( $p=0.003$ ).

Self-rated health had the strongest association to emotional exhaustion and is significantly associated to burnout ( $p<0.001$ ). In comparison to our previous study in Australian orthopedic surgeons who had a insignificant association ( $p=0.47$ ).<sup>2</sup> Thus stipulating a potential focus for current and future burnout prevention programs; access to gym and healthy eating facilities for time poor surgeons a recommendation for burnout minimization.

Contrasting previous studies, the relationship between current career position and burnout or any of its subscales was insignificant ( $p=0.89$ ). Arora et al. described surgical trainees and residents to have higher emotional exhaustion and depersonalization scores and lower personal accomplishment when compared to senior faculty.<sup>7</sup> Sargent et al. study results show a surge in burnout and psychiatric morbidity in residents comparative to faculty members. Potential causes including increased work hours, poor work-life balance, debt load and professional relationships.<sup>12</sup> A potential cause for the disparity between our study and previous reports may be a differing hierarchical burden structure in the USA and India, in terms of roles and responsibility.

**Table 5**  
Univariate analysis of variables for their association with burnout.

| Category                                            | OR               | 95% CI     | p                  |
|-----------------------------------------------------|------------------|------------|--------------------|
| Sex (female vs male)                                | 1.68             | 0.36–7.78  | 0.51               |
| Age                                                 |                  |            |                    |
| 20–29                                               | 1.0 <sup>a</sup> |            | 0.01 <sup>b</sup>  |
| 30–39                                               | 2.82             | 1.18–6.73  |                    |
| 40–49                                               | 0.87             | 0.32–2.35  |                    |
| >50                                                 | 2.44             | 1.07–5.59  |                    |
| Number of children <sup>c</sup>                     | 0.89             | 0.68–1.15  | 0.36               |
| Marital status                                      |                  |            |                    |
| Married or De Facto                                 | 1.0 <sup>a</sup> |            | 0.001 <sup>b</sup> |
| Never married                                       | 1.95             | 1.03–3.69  |                    |
| Divorced                                            | 6.62             | 2.23–19.64 |                    |
| Spouse in medical Profession (Yes vs No)            | 1.53             | 0.89–2.63  | 0.12               |
| Current position                                    |                  |            |                    |
| Resident or senior resident                         | 1.0 <sup>a</sup> |            | 0.90 <sup>b</sup>  |
| Consultant                                          | 0.82             | 0.41–1.65  |                    |
| Head of department                                  | 1.33             | 0.48–3.71  |                    |
| Assistant professor/lecturer                        | 1.05             | 0.48–2.31  |                    |
| Associate/full professor                            | 0.92             | 0.27–3.15  |                    |
| Years worked as orthopaedic surgeon                 |                  |            |                    |
| 0–9                                                 | 1.0 <sup>a</sup> |            | 0.10 <sup>b</sup>  |
| 10–19                                               | 1.58             | 0.87–2.89  |                    |
| 20–29                                               | 0.53             | 0.20–1.45  |                    |
| Practice region                                     |                  |            |                    |
| North India                                         | 1.0 <sup>a</sup> |            | 0.15 <sup>b</sup>  |
| South India                                         | 1.04             | 0.49–2.21  |                    |
| East India                                          | 2.11             | 0.92–4.80  |                    |
| West India                                          | 0.77             | 0.36–1.64  |                    |
| Central India                                       | 0.61             | 0.19–2.00  |                    |
| Number of half-day session/week in public practice  |                  |            |                    |
| 0–3                                                 | 1.0 <sup>a</sup> |            | 0.07 <sup>b</sup>  |
| 4–5                                                 | 1.18             | 0.57–2.45  |                    |
| 6–7                                                 | 0.75             | 0.23–2.39  |                    |
| 8 or more                                           | 2.18             | 1.13–4.21  |                    |
| Number of half-day session/week in private practice |                  |            |                    |
| 0–3                                                 | 1.0 <sup>a</sup> |            | 0.19 <sup>b</sup>  |
| 4–5                                                 | 0.90             | 0.42–1.92  |                    |
| 6–7                                                 | 0.31             | 0.10–0.97  |                    |
| 8 or more                                           | 2.2              | 0.35–1.27  |                    |
| Income bracket                                      |                  |            |                    |
| Bottom 25%                                          | 1.0 <sup>a</sup> |            | 0.004 <sup>b</sup> |
| 25–49%                                              | 0.30             | 0.14–0.64  |                    |
| 50–74%                                              | 0.37             | 0.17–0.80  |                    |
| Top 25%                                             | 0.82             | 0.35–1.94  |                    |
| Smoker(yes vs no)                                   | 0.67             | 0.37–1.20  | 0.18               |
| Self-rated health <sup>c</sup>                      | 0.42             | 0.30–0.59  | <0.001             |
| Satisfaction with career <sup>c</sup>               | 0.58             | 0.45–0.74  | <0.001             |
| Satisfaction with work life balance <sup>c</sup>    | 0.66             | 0.54–0.81  | <0.001             |
| Satisfaction with income <sup>c</sup>               | 0.56             | 0.44–0.72  | <0.001             |
| Considered leaving profession (Yes vs No)           | 2.35             | 1.15–4.79  | 0.02               |

<sup>a</sup> Reference category.

<sup>b</sup> Overall P value for the category.

<sup>c</sup> Odds ratio for a 1 unit change in the variable (higher vs lower).

#### 4.1. Recommendations for the future

Burnout in orthopedic surgeons may have devastating consequences for patient mortality and morbidity. The link between burnout and patient safety and medical errors is well established in the surgical literature, the depersonalization dimension associated with lower patient satisfaction and longer recovery times.<sup>3,13</sup> Past interventions to reduce burnout have targeted individuals rather than organizational and social contexts within which they practice.<sup>3</sup> Halbesleben and Rathert recommended implementation of proactive steps to reduce burnout through system wide

**Table 6**  
Multivariate analysis: variables associated with burnout.

| Category                           | OR               | 95% CI     | p                  |
|------------------------------------|------------------|------------|--------------------|
| Age                                |                  |            |                    |
| 20–29                              | 1.0 <sup>i</sup> |            | 0.01 <sup>*</sup>  |
| 30–39                              | 3.44             | 1.15–10.33 |                    |
| 40–49                              | 0.73             | 0.21–2.59  |                    |
| >50                                | 2.74             | 0.98–7.64  |                    |
| Marital status                     |                  |            |                    |
| Married or De Facto                | 1.0 <sup>i</sup> |            | 0.001 <sup>*</sup> |
| Never married                      | 2.59             | 1.04–6.47  |                    |
| Divorced                           | 17.34            | 3.02–99.55 |                    |
| Income bracket                     |                  |            |                    |
| Bottom 25%                         | 1.0 <sup>i</sup> |            | 0.05 <sup>*</sup>  |
| 25–49%                             | 0.31             | 0.12–0.78  |                    |
| 50–74%                             | 1.30             | 0.48–3.50  |                    |
| Top 25%                            | 0.49             | 0.11–2.07  |                    |
| Self-rated health                  | 0.42             | 0.28–0.64  | <0.001             |
| Satisfaction with training pathway | 0.73             | 0.56–0.85  | 0.02               |

<sup>i</sup> Overall P value for the category.

<sup>i</sup> Reference category.

<sup>‡</sup> odds ratio for a 1 unit change in the variable (higher vs lower).

intervention programs, which will ultimately result in and improvement in patient quality of care.<sup>13</sup>

Given then novelty of this assessment in Indian surgeons and the significant variability to previous western studies, similar research would be valuable throughout the region, enabling cross study comparisons, validation and assessment of whether similar trends and associations exist. Additionally, the Indian medical industry is changing structurally, particularly in regards to patient relations (increase in litigation) thus it would be worthwhile to repeat this study in five to ten years and evaluate the change.

#### 4.2. Limitations

The available published studies, including our own previous study in Australian Orthopedic Surgeons, utilize public forums such as annual conferences as an avenue to assess an unbiased large distribution of doctors. However this introduces inherent limitations including a relatively low response rate (consistent amongst all studies of this kind). There may be a predisposition for burnt out surgeons to respond, in hope of initiating awareness or change, conversely their time constraints may inhibit them from participating. The assumption is that the number of respondents is a sufficient sample size demonstrating the general distribution (299 participants). This enables cross-study comparisons with similar methodological sampling. Additionally, the assessment of only surgeons whom attended the conference, potentially eliminates a demographic of those who cannot afford to or do not have time to attend, particularly in India. Finally caution is advised when interpreting MBI results internationally as the values vary dependent upon the many socioeconomic and cultural between countries.

#### 5. Conclusion

Burnout is a critical syndrome, affecting individuals in the medical field, particularly orthopedic surgeons. 23.1% of Indian orthopedic surgeons were burnt out; significantly lower than the rates measured in developed western nations. Marital status, health and satisfaction with training pathway have strongly significant association with burnout. Thus this study provides a point of reference/baseline for future burnout research in orthopedic and in general surgeons in India and surrounding countries in the east. Clearly delineating the key associations to



burnout, which future minimization interventions can target. One must remain mindful to the epidemic of burnout and continued vigilance and pro-active policy initiatives are the need of the hour.

### Conflict of interest

No benefits in any form have been received or will be received from a commercial party related directly or indirectly to the subject of this article.

### Funding

No funding was received by any of the authors in relation to this research.

### References

1. Maslach C, Schaufeli WB, Leiter MP. Job burnout. *Ann Rev Psychol.* 2001;52(1):397–422.
2. Arora M, Diwan AD, Harris IA. Prevalence and factors of burnout among Australian orthopaedic trainees: a crosssectional study. *J Orthop Surg.* 2014;22(3).
3. Montgomery A. The inevitability of physician burnout: implications for interventions. *Burnout Res.* 2014;1(1):50–56.
4. Gundersen L. Physician burnout. *Ann Intern Med.* 2001;135(2):145–148.
5. Sadat-Ali M, et al. Are orthopedic surgeons prone to burnout? *Saudi Med J.* 2005;26(8):1180–1182.
6. Shanafelt TD. Burnout and medical errors among American surgeons. *Ann Surg.* 2010;251(6):995–1000.
7. Arora M, Diwan AD, Harris IA. Burnout in orthopaedic surgeons: a review. *ANZ J Surg.* 2013;83(7–8):512–515.
8. Brazier J-, et al. Validating the SF-36 health survey questionnaire: new outcome measure for primary care. *Br Med J.* 1992;305(6846):160–164.
9. Bhugra D, Bhui K, Gupta KR. Burnout and stress among doctors and dentists in North India. *Int J Cult Ment Health.* 2008;1(1):24–29.
10. Carod-Artal FJ, Vázquez-Cabrera C. Burnout syndrome in an international setting. *Burnout for experts.* Springer; 2013:15–35.
11. Sargent MC, et al. Quality of life during orthopaedic training and academic practice. *J Bone Jt Surg.* 2012;94(19) p. e145.
12. Sargent MC, et al. Stress and coping among orthopaedic surgery residents and faculty. *J Bone Jt Surg.* 2004;86(7):1579–1586.
13. Halbesleben JR, Rathert C. Linking physician burnout and patient outcomes: exploring the dyadic relationship between physicians and patients. *Health Care Manage Rev.* 2008;33(1):29–39.



**To read all articles of this issue, you must be a member of ISKSAA.**

**If you are already a member of  
ISKSAA then please login to access the full issue.**



In Painful Knee OA & Post Arthroscopic Surgeries,



# R<sub>x</sub> HA-KEM

6 ml PFS of sodium hyaluronate for intra-articular use

The Long Lasting E. V. S



6 ml PFS



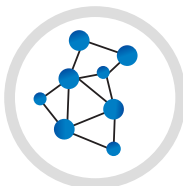
High molecular weight



A true balance of  
viscosity and elasticity<sup>1</sup>

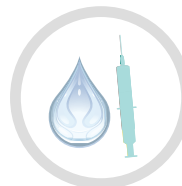


Non - avian source



Cross linked polymer<sup>2,3</sup>

- Offers high viscosity  
& residence time



Single shot treatment

1. Weiss C, et al, J Clin Rheumatol. 1999;5:S2-S11. 2. Gigante A et al. Rheumatology Int, 2011;31:427-444 3. Lannitti et al. Drugs R D 2011, 11(1):13-27  
E.V.S – Elasto Visco Supplement



For **Pain** free joints

# Jointace<sup>®</sup> c2+

TABLETS



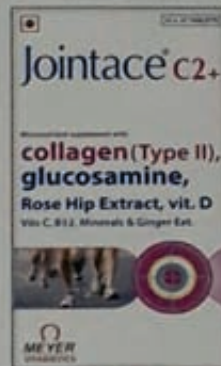
**The Natural Cartilage Revitalizer**

## Rx In

- ▣ Early Osteoarthritis
- ▣ Early Rheumatoid Arthritis
- ▣ Meniscus Tear
- ▣ To improve Joint Mobility & Flexibility
- ▣ Cartilage Regeneration

With added advantage  
of Rose Hip Extract  
& Extra Collagen

**- Dosage -**  
One Tablet Twice Daily  
After main meal



**MEYER**  
VITABIOTICS

P.T.O

## CALCIUM

### Calcimax<sup>®</sup> K2

Elemental Calcium 200mg

|                |          |
|----------------|----------|
| Calcitriol     | 0.25 mcg |
| Vitamin K2-7   | 50 mg    |
| Elemental Zinc | 7.5 mg   |
| Magnesium      | 50 mg    |

### Calcimax<sup>®</sup> K2 Plus

Elemental Calcium 500mg

|                |          |
|----------------|----------|
| Calcitriol     | 0.25 mcg |
| Vitamin K2-7   | 50 mg    |
| Elemental Zinc | 7.5 mg   |
| Magnesium      | 50 mg    |

**MEYER**  
VITABIOTICS

Safest **NSAID Delivery** in all Acute & Chronic pain conditions

## Ugesic<sup>®</sup>

Proxicam 20mg SUBLINGUAL Tablets

**Safer & Faster Pain Reliever**

**Fastest Dissolution time :**

**" 52 secs "**



**RAPID ACTION**



**MEYER**  
VITABIOTICS

MEYER DRUGS PVT. LTD. 200/201, 200/202  
43/1, High Street, Thane, Mumbai - 400  
Email: info@mevita.com

Visit us for the health consultation and special updates on Facebook & Twitter  
facebook.com/MeyerVitabiotics @Mevitabiotics

www.meyer.co.in





Easy access to the research performance  
of 220 nations and 7,500 research  
institutions worldwide

## SciVal

SciVal supports the needs of a broad range of institutional users by providing ready-made, at-a-glance snapshots for flexible, institution-specific insight.



**Visualize research performance**  
*Specific to Vice Rectors For Research*

- Performance Overview to inform strategic planning
- Identify institution's strengths and short-comings



**Develop collaborative partnerships**  
*Specific to Department Heads*

- Evaluate researcher and team performance for informed decisions
- Model-test scenarios by creating virtual teams



**Benchmark your progress**  
*Specific to Research Administrators*

- Create management-level reports
- Accelerate institutional and cross-institutional collaboration
- Support and win large



**Analyze research trends**  
*Specific to Researchers*

- Raise visibility and highlight achievements
- Expand networks
- Locate collaborators and mentors

For more information: [elsevier.com](https://elsevier.com)

