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ЕЖЕМЕСЯЧНЫЙ НАУЧНЫЙ ЖУРНАЛ

Медицинские новости Грузии

საქართველოს სამედიცინო სიახლენი

GEORGIAN MEDICAL NEWS

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GMN: Georgian Medical News is peer-reviewed, published monthly journal committed to promoting the science and art of medicine and the betterment of public health, published by the GMN Editorial Board since 1994. GMN carries original scientific articles on medicine, biology and pharmacy, which are of experimental, theoretical and practical character; publishes original research, reviews, commentaries, editorials, essays, medical news, and correspondence in English and Russian.

GMN is indexed in MEDLINE, SCOPUS, PubMed and VINITI Russian Academy of Sciences. The full text content is available through EBSCO databases.

GMN: Медицинские новости Грузии - ежемесячный рецензируемый научный журнал, издаётся Редакционной коллегией с 1994 года на русском и английском языках в целях поддержки медицинской науки и улучшения здравоохранения. В журнале публикуются оригинальные научные статьи в области медицины, биологии и фармации, статьи обзорного характера, научные сообщения, новости медицины и здравоохранения. Журнал индексируется в MEDLINE, отражён в базе данных SCOPUS, PubMed и ВИНИТИ РАН. Полнотекстовые статьи журнала доступны через БД EBSCO.

GMN: Georgian Medical News – საქართველოს სამედიცინო სიახლენი – არის ყოველთვიური სამეცნიერო სამედიცინო რეცენზირებადი ჟურნალი, გამოიცემა 1994 წლიდან, წარმოადგენს სარედაქციო კოლეგიისა და აშშ-ის მეცნიერების, განათლების, ინდუსტრიის, ხელოვნებისა და ბუნებისმეტყველების საერთაშორისო აკადემიის ერთობლივ გამოცემას. GMN-ში რუსულ და ინგლისურ ენებზე ქვეყნდება ექსპერიმენტული, თეორიული და პრაქტიკული ხასიათის ორიგინალური სამეცნიერო სტატიები მედიცინის, ბიოლოგიისა და ფარმაციის სფეროში, მიმოხილვითი ხასიათის სტატიები.

ჟურნალი ინდექსირებულია MEDLINE-ის საერთაშორისო სისტემაში, ასახულია SCOPUS-ის, PubMed-ის და ВИНИТИ РАН-ის მონაცემთა ბაზებში. სტატიების სრული ტექსტი ხელმისაწვდომია EBSCO-ს მონაცემთა ბაზებიდან.

WEBSITE

www.geomednews.com

К СВЕДЕНИЮ АВТОРОВ!

При направлении статьи в редакцию необходимо соблюдать следующие правила:

1. Статья должна быть представлена в двух экземплярах, на русском или английском языках, напечатанная через **полтора интервала на одной стороне стандартного листа с шириной левого поля в три сантиметра**. Используемый компьютерный шрифт для текста на русском и английском языках - **Times New Roman** (**Кириллица**), для текста на грузинском языке следует использовать **AcadNusx.** Размер шрифта - **12**. К рукописи, напечатанной на компьютере, должен быть приложен CD со статьей.

2. Размер статьи должен быть не менее десяти и не более двадцати страниц машинописи, включая указатель литературы и резюме на английском, русском и грузинском языках.

3. В статье должны быть освещены актуальность данного материала, методы и результаты исследования и их обсуждение.

При представлении в печать научных экспериментальных работ авторы должны указывать вид и количество экспериментальных животных, применявшиеся методы обезболивания и усыпления (в ходе острых опытов).

4. К статье должны быть приложены краткое (на полстраницы) резюме на английском, русском и грузинском языках (включающее следующие разделы: цель исследования, материал и методы, результаты и заключение) и список ключевых слов (key words).

5. Таблицы необходимо представлять в печатной форме. Фотокопии не принимаются. **Все цифровые, итоговые и процентные данные в таблицах должны соответствовать таковым в тексте статьи**. Таблицы и графики должны быть озаглавлены.

6. Фотографии должны быть контрастными, фотокопии с рентгенограмм - в позитивном изображении. Рисунки, чертежи и диаграммы следует озаглавить, пронумеровать и вставить в соответствующее место текста **в tiff формате**.

В подписях к микрофотографиям следует указывать степень увеличения через окуляр или объектив и метод окраски или импрегнации срезов.

7. Фамилии отечественных авторов приводятся в оригинальной транскрипции.

8. При оформлении и направлении статей в журнал МНГ просим авторов соблюдать правила, изложенные в «Единых требованиях к рукописям, представляемым в биомедицинские журналы», принятых Международным комитетом редакторов медицинских журналов - http://www.spinesurgery.ru/files/publish.pdf и http://www.nlm.nih.gov/bsd/uniform_requirements.html
В конце каждой оригинальной статьи приводится библиографический список. В список литературы включаются все материалы, на которые имеются ссылки в тексте. Список составляется в алфавитном порядке и нумеруется. Литературный источник приводится на языке оригинала. В списке литературы сначала приводятся работы, написанные знаками грузинского алфавита, затем кириллицей и латиницей. Ссылки на цитируемые работы в тексте статьи даются в квадратных скобках в виде номера, соответствующего номеру данной работы в списке литературы. Большинство цитированных источников должны быть за последние 5-7 лет.

9. Для получения права на публикацию статья должна иметь от руководителя работы или учреждения визу и сопроводительное отношение, написанные или напечатанные на бланке и заверенные подписью и печатью.

10. В конце статьи должны быть подписи всех авторов, полностью приведены их фамилии, имена и отчества, указаны служебный и домашний номера телефонов и адреса или иные координаты. Количество авторов (соавторов) не должно превышать пяти человек.

11. Редакция оставляет за собой право сокращать и исправлять статьи. Корректура авторам не высылается, вся работа и сверка проводится по авторскому оригиналу.

12. Недопустимо направление в редакцию работ, представленных к печати в иных издательствах или опубликованных в других изданиях.

При нарушении указанных правил статьи не рассматриваются.

REQUIREMENTS

Please note, materials submitted to the Editorial Office Staff are supposed to meet the following requirements:

1. Articles must be provided with a double copy, in English or Russian languages and typed or compu-ter-printed on a single side of standard typing paper, with the left margin of **3** centimeters width, and **1.5** spacing between the lines, typeface - **Times New Roman** (**Cyrillic**), print size - **12** (referring to Georgian and Russian materials). With computer-printed texts please enclose a CD carrying the same file titled with Latin symbols.

2. Size of the article, including index and resume in English, Russian and Georgian languages must be at least 10 pages and not exceed the limit of 20 pages of typed or computer-printed text.

3. Submitted material must include a coverage of a topical subject, research methods, results, and review.

Authors of the scientific-research works must indicate the number of experimental biological species drawn in, list the employed methods of anesthetization and soporific means used during acute tests.

4. Articles must have a short (half page) abstract in English, Russian and Georgian (including the following sections: aim of study, material and methods, results and conclusions) and a list of key words.

5. Tables must be presented in an original typed or computer-printed form, instead of a photocopied version. **Numbers, totals, percentile data on the tables must coincide with those in the texts of the articles.** Tables and graphs must be headed.

6. Photographs are required to be contrasted and must be submitted with doubles. Please number each photograph with a pencil on its back, indicate author's name, title of the article (short version), and mark out its top and bottom parts. Drawings must be accurate, drafts and diagrams drawn in Indian ink (or black ink). Photocopies of the X-ray photographs must be presented in a positive image in **tiff format**.

Accurately numbered subtitles for each illustration must be listed on a separate sheet of paper. In the subtitles for the microphotographs please indicate the ocular and objective lens magnification power, method of coloring or impregnation of the microscopic sections (preparations).

7. Please indicate last names, first and middle initials of the native authors, present names and initials of the foreign authors in the transcription of the original language, enclose in parenthesis corresponding number under which the author is listed in the reference materials.

8. Please follow guidance offered to authors by The International Committee of Medical Journal Editors guidance in its Uniform Requirements for Manuscripts Submitted to Biomedical Journals publication available online at: http://www.nlm.nih.gov/bsd/uniform_requirements.html
http://www.icmje.org/urm_full.pdf
In GMN style for each work cited in the text, a bibliographic reference is given, and this is located at the end of the article under the title "References". All references cited in the text must be listed. The list of references should be arranged alphabetically and then numbered. References are numbered in the text [numbers in square brackets] and in the reference list and numbers are repeated throughout the text as needed. The bibliographic description is given in the language of publication (citations in Georgian script are followed by Cyrillic and Latin).

9. To obtain the rights of publication articles must be accompanied by a visa from the project instructor or the establishment, where the work has been performed, and a reference letter, both written or typed on a special signed form, certified by a stamp or a seal.

10. Articles must be signed by all of the authors at the end, and they must be provided with a list of full names, office and home phone numbers and addresses or other non-office locations where the authors could be reached. The number of the authors (co-authors) must not exceed the limit of 5 people.

11. Editorial Staff reserves the rights to cut down in size and correct the articles. Proof-sheets are not sent out to the authors. The entire editorial and collation work is performed according to the author's original text.

12. Sending in the works that have already been assigned to the press by other Editorial Staffs or have been printed by other publishers is not permissible.

Articles that Fail to Meet the Aforementioned Requirements are not Assigned to be Reviewed.

ავტორთა საყურადღებოდ!

რედაქციაში სტატიის წარმოდგენისას საჭიროა დავიცვათ შემდეგი წესები:

1. სტატია უნდა წარმოადგინოთ 2 ცალად, რუსულ ან ინგლისურ ენებზე,დაბეჭდილი სტანდარტული ფურცლის 1 გვერდზე, 3 სმ სიგანის მარცხენა ველისა და სტრიქონებს შორის 1,5 ინტერვალის დაცვით. გამოყენებული კომპიუტერული შრიფტი რუსულ და ინგლისურენოვან ტექსტებში - **Times New Roman (Кириллица)**, ხოლო ქართულენოვან ტექსტში საჭიროა გამოვიყენოთ **AcadNusx.** შრიფტის ზომა – 12. სტატიას თან უნდა ახლდეს CD სტატიით.

2. სტატიის მოცულობა არ უნდა შეადგენდეს 10 გვერდზე ნაკლებს და 20 გვერდზე მეტს ლიტერატურის სიის და რეზიუმეების (ინგლისურ, რუსულ და ქართულ ენებზე) ჩათვლით.

3. სტატიაში საჭიროა გაშუქდეს: საკითხის აქტუალობა; კვლევის მიზანი; საკვლევი მასალა და გამოყენებული მეთოდები; მიღებული შედეგები და მათი განსჯა. ექსპერიმენტული ხასიათის სტატიების წარმოდგენისას ავტორებმა უნდა მიუთითონ საექსპერიმენტო ცხოველების სახეობა და რაოდენობა; გაუტკივარებისა და დაძინების მეთოდები (მწვავე ცდების პირობებში).

4. სტატიას თან უნდა ახლდეს რეზიუმე ინგლისურ, რუსულ და ქართულ ენებზე არანაკლებ ნახევარი გვერდის მოცულობისა (სათაურის, ავტორების, დაწესებულების მითითებით და უნდა შეიცავდეს შემდეგ განყოფილებებს: მიზანი, მასალა და მეთოდები, შედეგები და დასკვნები; ტექსტუალური ნაწილი არ უნდა იყოს 15 სტრიქონზე ნაკლები) და საკვანძო სიტყვების ჩამონათვალი (key words).

5. ცხრილები საჭიროა წარმოადგინოთ ნაბეჭდი სახით. ყველა ციფრული, შემაჯამებელი და პროცენტული მონაცემები უნდა შეესაბამებოდეს ტექსტში მოყვანილს.

6. ფოტოსურათები უნდა იყოს კონტრასტული; სურათები, ნახაზები, დიაგრამები - დასათაურებული, დანომრილი და სათანადო ადგილას ჩასმული. რენტგენოგრამების ფოტოასლები წარმოადგინეთ პოზიტიური გამოსახულებით **tiff** ფორმატში. მიკროფოტოსურათების წარწერებში საჭიროა მიუთითოთ ოკულარის ან ობიექტივის საშუალებით გადიდების ხარისხი, ანათალების შეღებვის ან იმპრეგნაციის მეთოდი და აღნიშნოთ სურათის ზედა და ქვედა ნაწილები.

7. სამამულო ავტორების გვარები სტატიაში აღინიშნება ინიციალების თანდართვით, უცხოურისა – უცხოური ტრანსკრიპციით.

8. სტატიას თან უნდა ახლდეს ავტორის მიერ გამოყენებული სამამულო და უცხოური შრომების ბიბლიოგრაფიული სია (ბოლო 5-8 წლის სიღრმით). ანბანური წყობით წარმოდგენილ ბიბლიოგრაფიულ სიაში მიუთითეთ ჯერ სამამულო, შემდეგ უცხოელი ავტორები (გვარი, ინიციალები, სტატიის სათაური, ჟურნალის დასახელება, გამოცემის ადგილი, წელი, ჟურნალის №, პირველი და ბოლო გვერდები). მონოგრაფიის შემთხვევაში მიუთითეთ გამოცემის წელი, ადგილი და გვერდების საერთო რაოდენობა. ტექსტში კვადრატულ ფჩხილებში უნდა მიუთითოთ ავტორის შესაბამისი N ლიტერატურის სიის მიხედვით. მიზანშეწონილია, რომ ციტირებული წყაროების უმეტესი ნაწილი იყოს 5-6 წლის სიღრმის.

9. სტატიას თან უნდა ახლდეს: ა) დაწესებულების ან სამეცნიერო ხელმძღვანელის წარდგინება, დამოწმებული ხელმოწერითა და ბეჭდით; ბ) დარგის სპეციალისტის დამოწმებული რეცენზია, რომელშიც მითითებული იქნება საკითხის აქტუალობა, მასალის საკმაობა, მეთოდის სანდოობა, შედეგების სამეცნიერო-პრაქტიკული მნიშვნელობა.

10. სტატიის ბოლოს საჭიროა ყველა ავტორის ხელმოწერა, რომელთა რაოდენობა არ უნდა აღემატებოდეს 5-ს.

11. რედაქცია იტოვებს უფლებას შეასწოროს სტატია. ტექსტზე მუშაობა და შეჯერება ხდება საავტორო ორიგინალის მიხედვით.

12. დაუშვებელია რედაქციაში ისეთი სტატიის წარდგენა, რომელიც დასაბეჭდად წარდგენილი იყო სხვა რედაქციაში ან გამოქვეყნებული იყო სხვა გამოცემებში.

აღნიშნული წესების დარღვევის შემთხვევაში სტატიები არ განიხილება.

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No 6 (363) 2025

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FEMOROACETABULAR IMPINGEMENT: PREVALENCE OF RADIOGRAPHIC MORPHOLOGY IN INDIAN POPULATION, ETIOLOGY AND CLINICAL MANAGEMENT

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Abstract.

Background: Femoroacetabular impingement (FAI) is an often-unnoticed cause of hip and groin pain in adolescents and adults. If untreated, it is a precursor of early primary hip osteoarthritis. The prevalence of FAI in Indian population is under-documented. Current study aims to determine the prevalence of radiographic morphology of FAI in random individuals undergoing pelvic radiography at the tertiary healthcare referral hospital and analyze the associated groin pain, etiological factors and clinical management.

Methods: This observational cross-sectional study included 550 patients, 18 to 50 years of age. Pelvic radiographs were prospectively analyzed for FAI signs. Groin pain was assessed with Non-Arthritic Hip Score (NAHS). Hips were classified based on the number of present radiological abnormalities and symptomatic groin pain. Patients with clinical symptoms were investigated by computed tomography (CT) scans and conservatively managed. Multivariate logistic regression analysis was used for etiological risk factor analysis.

Results: Radiographic morphology of FAI was prevalent in total 453 individuals (82%) and 803 hips (73%). Out of these, 350 individuals (77%) had bilateral and 103 (23%) had unilateral findings. Mean age of study population with mixed urban rural ethnicity was 32.3+17.8 years. Male to female ratio was 2:1. Lateral center-edge angle was the most common finding (32.6%), and crossover sign was the least (6%). Pincer morphology was predominant finding (36.2%), followed by mixed (22.8%) and cam (13.5%). Among these, only 110 hips (10%) clinically experienced pain (with mean NAHS score of 87.4) of which 69 hips presented multiple radiological morphologies of FAI that significantly corelated with CT scan findings. Significant associations of result (p-value <0.05) were revealed with demographic parameters, baseline characteristics and multiple etiological factors.

Conclusion: Radiographic morphology of FAI is prevalent in 82% of studied Indian population and 73% of total hips. These findings were accurately validated on CT scans in symptomatic 10% patients. Causal etiological association found out can successfully guide future self-preventive measures required to prevent development of this musculoskeletal disease in young adults. Long-term conservative management shows encouraging results with possible pain free survival.

Key words. Femoroacetabular impingement, pincer morphology, cam morphology, young population, osteoarthritis, pelvic radiographs.

Introduction.

Femoroacetabular Impingement (FAI) is a condition where anatomical incongruences between femoral head and acetabulum lead to abnormal bony contacts during hip movements, particularly during flexion in internal rotation [1]. This abnormal contact increases stress and friction at the hip joint interface, causing structural damage to the articular cartilage and acetabulum labral tissue. This in turn might lead to painful hip movements, functional impairment and an increased risk of early hip joint degeneration, potentially progressing to osteoarthritis [2]. FAI is not an uncommon cause of pain around the hip joint in teenagers and young adults. If untreated, it is a precursor of primary hip osteoarthritis. Pincer or Cam impingement conditions, marked by abnormal acetabular or femoral head-neck junction morphology, lead to joint stress, cartilage erosion, labral injury, and early arthritis.

The concept of hip impingement was first introduced by Smith-Peterson et al. in 1936 [3], with a more comprehensive description provided by Ganz et al. in 2003 [4], who identified FAI as a precursor to hip osteoarthritis. Numerous studies have explored the prevalence of FAI in various populations. For instance, a 2021 study by Hasegawa et al. [5] in Japan reported a prevalence of FAI of 25.2% in individuals over 50 years old, with cam, pincer, and mixed deformities accounting for 4.2%, 20.3%, and 0.7%, respectively. Another study from Turkey by Polat et al. [6] in 2017 found a prevalence of FAI in asymptomatic individuals of around 40 years of age to be 29.6%, with cam, pincer, and mixed morphologies comprising 15.9%, 10.6%, and 3.1% of cases, respectively.

In the Indian context, a multicentric study by Pachore et al. [1] reported a 68% prevalence of FAI, with pincer deformity observed in 47.5% of cases, cam deformity in 7.9%, and mixed deformity in 10.8%. Another study by Raina et al. [7] found a 36.7% prevalence of pincer morphology in the asymptomatic Indian population. There is limited data on FAI prevalence in the Indian subcontinent, particularly among symptomatic populations. Understanding its prevalence is crucial for monitoring specific groups and preventing early hip degeneration. Accurate diagnosis requires history, clinical examination, and imaging, with radiographs as the first step and computed tomography (CT) / magnetic resonance imaging (MRI) for confirmation. Early detection allows for timely intervention to preserve joint function. Current study aims to determine the prevalence of radiographic morphology of FAI in random individuals undergoing pelvic radiography at the tertiary healthcare referral hospital. It also compares radiographic and CT findings, offering a more accurate assessment to support targeted interventions for preventing osteoarthritis in this population. Secondary objectives were to assess etiological factors associated with FAI and clinical management of symptomatic hip pain patients prospectively.

Materials and Methods.

This study is an observational, cross-sectional analysis conducted at the Orthopedics department of tertiary health care referral hospital from 2022 to 2024. Written informed consent was obtained from all participants. Ethical clearance was granted by the institution's ethical committee for this study. Patients were selected based on following inclusion criteria: a) age between 18 to 50 years willing to answer history taking questions, b) individuals presenting or being admitted in outpatient, inpatient, emergency departments and c) undergoing pelvic radiographic investigations in radiology department. Exclusion criteria included a) patients with hip, pelvis or lower limb fractures, b) previous hip surgery or history of hip pathology and treatment, c) pregnancy, d) moribund polytrauma and e) psychiatric illness. Random sampling was done from a collective sample of random individuals presenting to random specialty departments of the hospital and undergoing pelvic radiographic imaging in the radiology department. Sample size was calculated using power analysis based on the expected prevalence of radiographic morphology of FAI in Indian population [1]. After adjusting for a 10% data loss factor and 5% chance of occurrence of type 1 error for a 95% significance level, minimum sample size required was 200. A computer-generated permuted block randomization model was employed for random sampling of final 610 individuals from a random pool of 1348 Indian people in order to substantially enhance the power of study.

The study involved the radiographic evaluation of 610 individuals using pelvic radiographs (pelvis with bilateral hip anteroposterior view, hip lateral view) to identify signs of FAI. 60 participants were not included in the final analysis due to poor imaging. Finally, a random sample of 550 individuals with 1100 hips was achieved for further analysis. Sample displayed homogeneity in terms of race, ethnicity and accurately represented the general Indian population. History of groin pain was also taken from the study participants. If present, groin pain was assessed and scoring performed according to the Non-Arthritic Hip Score. Patients with groin pain underwent pelvis CT scans for confirmation of radiographic findings.

Radiographs were analyzed for qualitative signs of FAI such as crossover sign, posterior wall sign, pistol grip deformity and ischial spine sign. Quantitative parameters such as alpha angle and lateral center-edge (LCE) angle were measured using GeoGebra Geometry software, which permits geometric constructions based on radiographic images. In order to warrant the precision, repeatability and reproducibility of radiographic measurements, a standardized measurement protocol was followed thoroughly and a reliability analysis was conducted to calculate Intraclass correlation coefficients (ICC). A single observer blinded to the initial results, re-measured the angles in 50 randomly selected hips after an interval of 2 weeks to assess intra-observer reliability. A second observer independently measured the same set of 50 hips using the same software and protocol to evaluate inter-observer agreement. CT scans were evaluated for quantitative parameters such as alpha angle and LCE angle. All data, including demographic details, baseline characteristics, patient history, radiographic and CT findings, were meticulously recorded on patient data sheets for further analysis. A patient reported questionnaire was prepared to assess association with common etiological factors. Patients with clinical symptoms were investigated by computed tomography (CT) scans and conservatively managed along a standardized longitudinal follow-up visit protocol.

Assessment of Pelvis CT scan:

- **Alpha angle:** Alpha angle was measured on the coronal sections of the pelvic CT scans. “An abnormal alpha angle suggesting FAI was defined as an angle > 50°” [8].
- **The ‘Lateral center-edge angle’:** LCE angle was measured on the coronal sections of hip CT. An abnormal center-edge angle was defined as an angle > 40° [9].

Analysis of Radiographic Findings:

- **Radiographic Findings Categorization:** Acetabular Rotation Abnormalities (R): Includes the crossover sign, ischial spine sign, and posterior wall sign. Acetabular Over-Coverage Abnormalities (O): Includes the lateral center-edge angle and acetabular index. Femoral Head-Neck Abnormalities (H): Includes the alpha angle and pistol grip deformity.
- **Classification of Hip Deformities:** Cam Type: Hips with femoral head-neck abnormalities (H). Pincer Type: Hips with both acetabular rotation (R) and over-coverage (O) abnormalities. Mixed Type: Hips exhibiting overlapping features of cam and pincer deformities.
- **Further Categorization Based on Abnormalities:** Type N: Normal hips without any abnormalities. Type I: Hips with a single abnormality (R, O, or H). Type II: Hips with two abnormalities (R/O, O/H, or H/R). Type III: Hips with all three abnormalities (R, O, and H).

Statistical Analysis:

Statistical analysis was performed using SPSS software. Pelvic radiographs were analyzed for abnormal morphologies, both qualitative and quantitative. The presence of radiographic signs of FAI and types of deformities were estimated and tabulated by gender. Standard descriptive statistics like means, standard deviations (SD), ranges and percentiles were employed to describe the demographic and baseline characteristics. Student’s t-test was applied for numeric variables and Chi-square test for categorical variables and assessing associations between different radiographic signs, hip deformities, and gender. Additionally, the relationship between FAI, groin pain and varied etiological factors were evaluated. The mean alpha angle and mean LCE angle were calculated. Correlaton between right and left sides was analyzed by Spearman’s correlation coefficient. Findings based on the observations between radiographs and CT scans were compared for abnormal alpha and LCE angles. Multivariate logistic regression analysis was used for determination of possible interactions between observed parameters and etiological risk factor analysis. A p-value<0.05 was considered statistically significant.

Results.

Radiographic morphology of FAI was prevalent in total 453 individuals (82%) and 803 hips (73%). Out of these, 350 individuals (77%) had bilateral (Figure 1) and 103 individuals (23%) had unilateral (Figure 2) findings. Mean age of individuals with mixed urban rural ethnicity was 32.3+17.8 years. Male to

Figure 1. *Young adult of 37 years has developing bilateral painful Cam lesions, as clearly seen in following magnified views of bilateral femoral necks.*

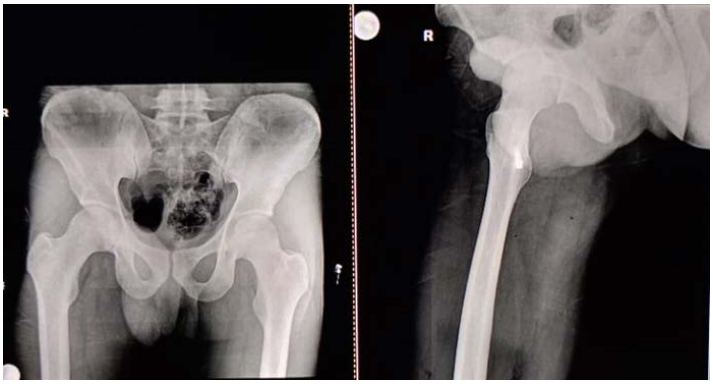

Figure 2. *Pistol grip deformity in CAM type of FAI of unilateral painful right hip as clearly seen on anteroposterior and lateral radiographs of 22 years old athlete.*

Figure 3. *Bilateral mixed type of FAI with bilateral LCEA > 40 degrees on measurement as depicted. Marked pistol grip deformity is evident in left hip in 48 years old male patient.*

female ratio was 2:1. ICC obtained for intra- and inter-observer reliability were 0.97 and 0.91 respectively. This indicates excellent reliability and repeatability of GeoGebra based hip angle measurements in this study.

The most common radiographic abnormality evident was abnormal lateral center-edge (LCE) angle, present in 359 hips (32.6%) (Figure 3). This sign was more prevalent in females (35.8%) than males (31.1%, p=0.6). The mean LCE angle was 36.6° for males and 37.9° for females, with the highest values being slightly higher in males (54.2°) compared to females (53.6°). The crossover sign, an indicator of acetabular retroversion, was the least common, found in 66 hips (6%). It was slightly more common in males (6.6%) compared to females (4.7%). The pistol grip deformity was observed in 152 hips (13.8%), with a higher prevalence in males (16.9%) compared to females (7.4%) demonstrating a significant difference between genders (p=0.024) (Figure 4). The ischial spine sign was present in 138 hips (12.6%), more common in females (16.9%) compared to males (10.6%). The posterior wall sign was seen in 286 hips (26%), more common in males (27.1%) than in females (23.6%). The abnormal alpha angle was present in 294 hips (26.7%), occurring more frequently in females (33.8%) compared to males (23.1%). The mean alpha angle was 45.4° for males and 47.3° for females, with the highest values being similar (83.8° for males and 83.3° for females).

The most common deformity type was ‘pincer’ only, found in 402 hips (36.2%) (Figure 5). The ‘cam’ only deformity was present in 150 hips (13.5%), and mixed deformity was observed in 251 hips (22.6%). Normal hips accounted for 297 hips (26.7%). Males had a marginally higher prevalence of cam and pincer deformities and a slightly lower prevalence of mixed deformities in comparison to opposite sex (p>0.05) (Table 1).

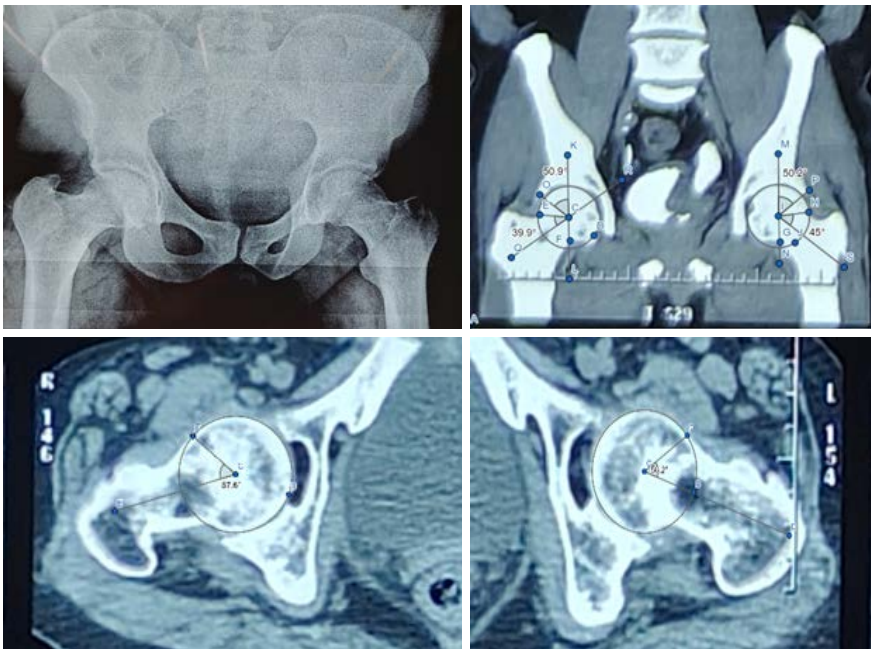

Figure 4. *Bilateral mixed type of FAI confirmed by CT scan angle measurements of LCEA and alpha angles, showing evident pistol grip deformity in both hips of a 46-year-old male patient.*

Figure 5. *Pincer type of FAI of right hip of 43 years old male farmer diagnosed by LCEA measurement on radiograph and validated on CT correlation.*

Hips with a single abnormality were the most common, present in 464 hips (42.2%), with acetabular rotational abnormality (16.2%), femoral head abnormality (13.5%), and acetabular over coverage (12.4%). Two types of abnormalities were found in 261 hips (23.7%), with acetabular rotational and femoral head abnormalities being the most common combination. Only 73 hips (6.6%) had all three types of abnormalities (Table 2).

100 (18.2%) out of total 550 patients reported presence of hip or groin pain (p-value>0.05) and were prospectively analyzed for natural history, evolution of symptoms along with outcomes of conservative management along a standardized longitudinal follow-up visit protocol. Painful hips were found in 110 out of 1,100 hips (10%), having mean NAHS of 81.4 with maximum and minimum score of 93 and 62.5 respectively. 69 painful hips (62.7%) in 62 individuals among these had radiological morphology of FAI. 55 (88.7%) out of 62 individuals reported unilateral hip or groin pain. However, only 7 individuals (11.3%) complained of bilateral groin pain and simultaneously demonstrated radiographic morphology of both hips. 41 painful hips (37.3%) in 38 individuals without any radiographic morphology of FAI were diagnosed as muscle spasm, sprain or early stages of avascular necrosis of hip accordingly to the results of further investigations like MRI. There was no significant difference (p=0.139) between hips with or without radiological signs of FAI regarding the presence of groin pain (Table 3). The pain was mild to moderate in nature, aggravated on weight bearing, squatting and clinical examination demonstrated pain on higher ranges of hip internal rotation, flexion and abduction. Patients presented with antalgic gait with shorter stance phase on the affected side.

We analyzed CT scans of the 100 patients (58 males, 42 females) who had pelvis x-rays for suspected FAI and presence of groin pain. Cam morphology, indicated by the alpha angle, was present in 54 hips on radiographs and 46 hips on CT scans. Pincer morphology, measured by the LCE angle, was found in 66 hips on radiographs and 70 on CT scans. Mixed-type morphology was observed in 30 hips on CT scans. The mean alpha and LCE angles were 47.3° ± 9.7° and 37.1° ± 7.3° on radiographs, compared to 44.1° ± 9.1° and 39.2° ± 6.3° on CT scans. Maximum alpha and LCE angles were 83.8° and 54.2° on radiographs, and 78.6° and 56.7° on CT scans. Tight correlation between both right and left hips was evident (r=0.621, p-value<0.05).

Table 1. *This table shows the distribution of prevalence of Cam, Pincer, and Mixed hip deformities divided by gender (N = number of hips having the deformity).*

Hip Deformity	Male Hips (n=738)		Female Hips (n=362)		Total Hips (n=1100)		P value
	N	% prevalence	N	% prevalence	N	% prevalence	
'Cam' only	105	14.2%	45	12.1%	150	13.5%	0.660
'Pincer' only	269	36.4%	133	35.8%	402	36.2%	0.917
Mixed	164	22.1%	87	24.3%	251	22.8%	0.634
Normal	200	27.1%	97	27.7%	297	27.3%	0.911

Table 2. *This table presents the number and prevalence of various types of hip abnormalities categorized into Type 1, Type 2, and Type 3, along with the number of normal hips.*

HIP ABNORMALITY	SUBTYPE	NUMBER	% PREVALENCE
TYPE 1	**O**	138	12.4%
	R	179	16.2%
	H	150	13.5%
	Total	467	42.2%
TYPE 2	**OR**	84	7.5%
	HO	61	5.5%
	HR	118	10.6%
	Total	263	23.7%
TYPE 3	**ORH**	73	6.6%
Normal hip	**N**	297	27.3%

Table 3. *This table summarizes the distribution of hips based on their radiographic findings suggestive of Femoroacetabular impingement (FAI), categorized into painful and painless hips, along with the total counts in each category.*

	Number of hips with FAI	Number of hips without FAI	Total
Number of painful hips	69	41	110
Number of painless hips	734	257	990
Total	803	297	1100

The group of individuals with radiographic morphology of FAI and presence of groin pain consisted of total 62 patients with mean age of 39.7+20.8 years. 55 patients (88.7%) among them demonstrated bilateral radiographic morphology, while rest 7 (11.3%) had only unilateral. All had multiple radiological morphologies of FAI present that significantly corelated with CT scan findings. These patients were definitely diagnosed as FAI. Natural history and causal etiological factors responsible for the disease were searched for from detailed history taking and pathological investigations. Etiological association of FAI was noticed with age, height, body mass index, vitamin D deficiency, trauma, prolonged squatting, repeated single leg standing or jumping, physically demanding occupations, competent endurance training, osteopenia, osteoporosis and alcohol intake (p-value<0.05). All symptomatic patients had association with more than one etiological factor. Linear relationship was observed between the number of etiological factors associated with the patient and clinical expression of radiographic morphology of FAI as well as groin pain. Presence of at least one etiological factor in all of the asymptomatic patients with radiographic findings of FAI further validates the causal association. After detailed counselling regarding prevention or modification of the risk factors of FAI present, none of the patient reported development of groin pain over time.

Natural history of FAI disease generally shows a gradual protracted course with symptoms flair ups seen to be temporally associated with exposure to one or more of the above etiological factors. In young athletic population, Cam deformity is commoner as they undergo strenuous endurance training for sports (Figure 6). Association of more than one etiological factor, predispose them to development of pain symptoms. Correct initiation of conservative management and avoidance of associated postural or lifestyle related causal etiological factors, successfully treat the symptoms and alter the natural course of FAI. This finding supports the basic developmental nature of this disease commonly evident in adolescent males at the time of physeal closure (Figures 7 and 8). Undiagnosed neglected hip impingement pain when left untreated, overtime reveals its natural course leading to distortion of hip anatomy, earlier degenerative osteoarthritis, decrease in neck shaft angle causing pistol grip deformity and eventually protrusio acetabuli (Figure 9). The affected limb is unable to bear body weight in upright posture and the patient is finally self-forced to mobilize with trunk flexed at the pelvis with the aid of support.

In patients having mixed associated acetabular over-coverage and minimal anterior head-neck offset, trivial trauma due to prolong stressful squatting posture causes bony impingement between the two closely contacting bony surfaces and resultant stress fracture development through the pathological bone on the anterosuperior surface of head-neck junction. Timely rest and conservative treatment show promising functional results in terms of union, range of motion and gait recovery

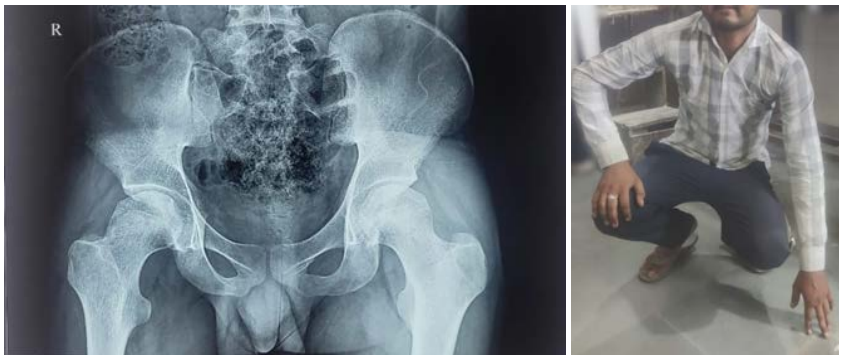

Figure 6. *Young patient of 20 years doing athletics endurance training for past 4 years, maltreated by massage, presenting with bilateral marked radiographic Cam morphology and demonstrating symptomatic right groin pain on squatting.*

Figure 7. *19 years old male, physiotherapy student, gives positive history of habitual squatting posture during daily activities and presents with moderate right hip pain of mid-term duration. Radiograph demonstrates bilateral (right>left) developing Cam lesions at anterosuperior head neck epi-metaphyseal junction due to non-anatomical physeal overgrowth.*

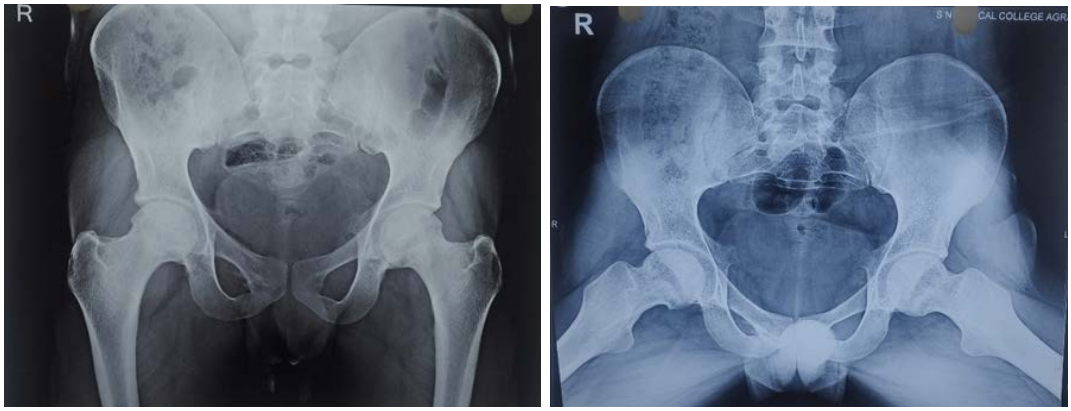

Figure 8. *20 years male shoe factory labourer with 3 years history of daily occupational prolong squatting mal-posture present with bilateral mixed FAI and moderate right groin pain being exaggerated by work.*

(Figure 10). Neglected inadequate treatment of the pathology further instigates the rate of bilateral hip osteoarthritis due to development of abnormal bony contacts and joint reaction forces from resulting coxa-vara. Patient's ability to bear body weight gets compromised as he continues exposure to associated risk factors, thereby reducing the limb function and quality of life (Figure 11).

Conservative management of symptomatic patients in the form of rest, posture correction, lifestyle modification, physical therapy, gait training, hip joint hydro dilation with saline injection, platelet rich plasma injection, anti-osteoporotic treatment, guided resistance training along with oral calcium, vitamin D and collagen supplementation showed promising outcomes at prospective longitudinal follow-up of 2 years, with mean NAHS score of 97.5, with maximum and minimum score of 100 and 93 respectively. None of the patients developed radiological signs of hip osteoarthritis. NAHS is a patient reported outcome measure and demonstrated a significant rise

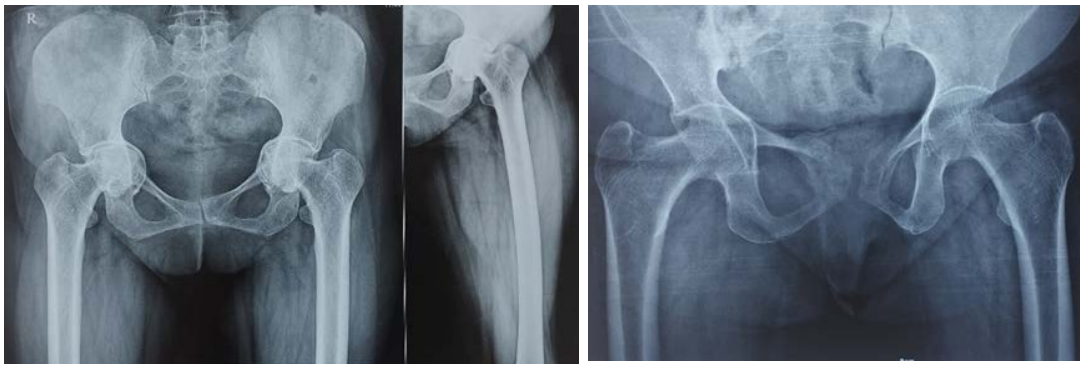

Figure 9. *Radiographs of 2 middle aged female patients, 45 and 49 years of age showing painful mixed FAI and advanced osteoarthritis. Common associated etiological factor was housemaid occupation requiring continuous squatting posture. Misdiagnosed and further neglected hip impingement pain when left untreated, overtime reveals its natural course leading to distortion of primary hip anatomy, earlier degenerative osteoarthritis, decrease in neck shaft angle causing coxa vara and eventually protrusio acetabuli.*

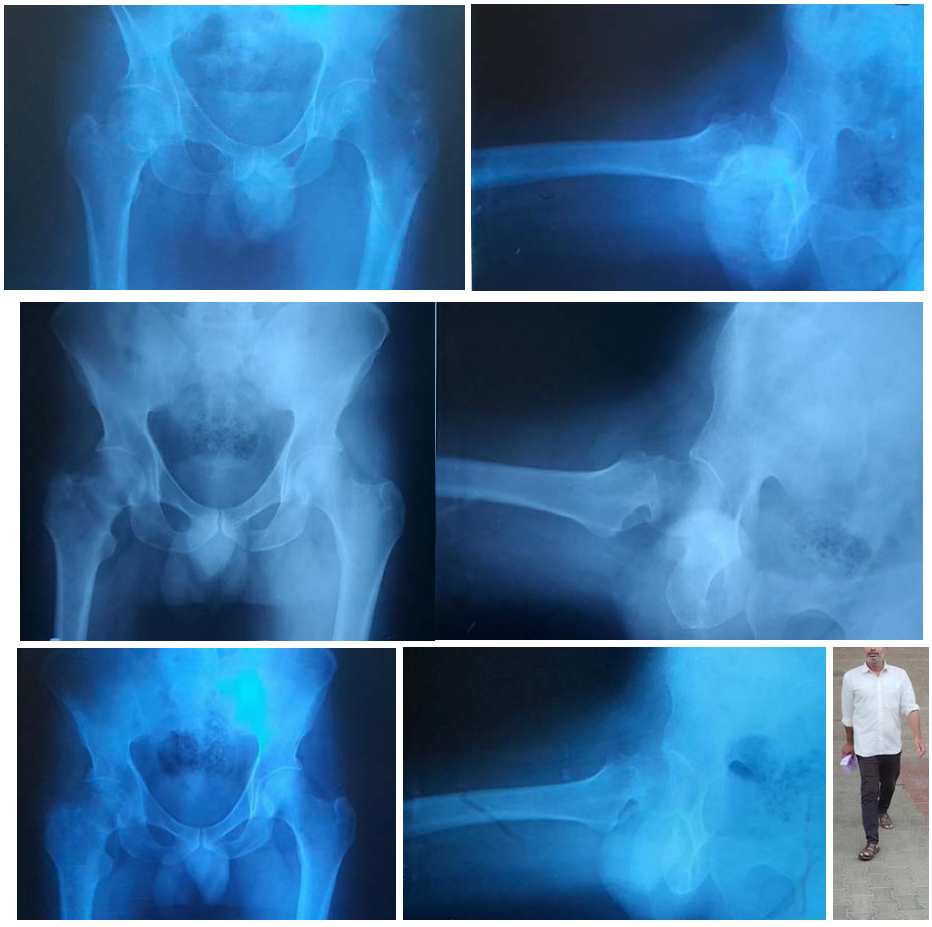

Figure 10. *42 years old male, alcoholic patient history of prolong squatting for recreational purposes, having mid-term insidious groin pain due to bilateral mixed FAI, naturally coursed into acute hip pain aggravating on internal rotation, during an episode of prolong squatting posture. X-rays reveal fragile fracture line running across the Cam lesion in the neck femur. Patient undergo timely rest and conservative management involving anti-osteoporotic medications. Monthly radiographs were taken to assess fracture union for 3 months as shown above. Callus formation was evident on final Xray and gradual partial weight baring was initiated with the aid of walker. Patient is walking pain-free without support at 9 months. Full range of motion is regained successfully through physiotherapy.*

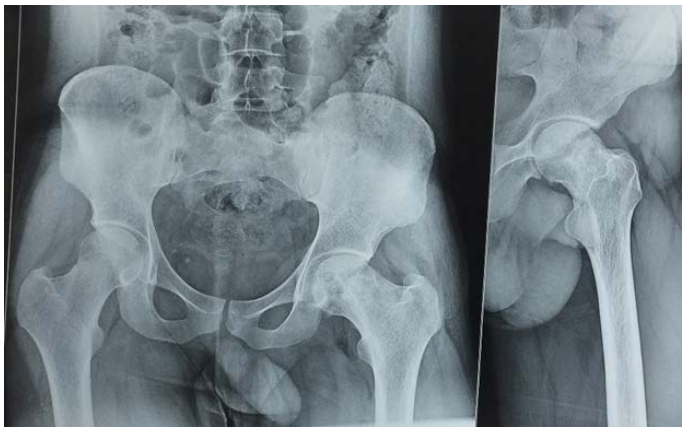

Figure 11. *27 years old long jumper having a past history of femoral neck stress fracture while jumping 2 years back. Neglected inadequate treatment of the pathology further instigates the rate of bilateral hip osteoarthritis due to development of abnormal bony contacts and joint reaction forces from resulting coxa-vara. Patient's ability to bear body weight gets compromised as he continues exposure to associated risk factors, thereby reducing the limb function and quality of life.*

of 16.1 points after 2 years of strictly adhered conservative management (p=0.01). This increment in mean NAHS score after conservative treatment was higher than minimal clinically important difference reported earlier. The statistically significant improvement in NAHS validates the efficacy of conservative management in clinical treatment of FAI.

Discussion.

FAI is an evolving clinical entity wherein abnormal hip morphology and altered biomechanics contribute to early degenerative changes in the hip joint [2,10]. Our findings indicate a prevalence of 73% for radiographic FAI, which is significantly higher than what has been reported in other studies. For instance, Agricola et al. (2013) [11] and Reichenbach et al. (2011) [12] reported prevalence rates of 67% and 60%, respectively, among asymptomatic individuals. These differences likely stem from variations in study populations, imaging techniques, and diagnostic criteria. Our higher FAI detection rate may result from a rise in number of patients seeking healthcare services, leading to greater identification of FAI abnormalities.

Our study found that 36.2% of hips had pincer deformities, 13.5% had cam deformities, and 22.8% exhibited mixed deformities. These results are slightly lower than those reported in Mascarenhas et al.'s systematic review, which found a 57% prevalence for pincer impingement and 22% for cam impingement among asymptomatic individuals [13]. Variations in the prevalence of different deformity types across studies can be attributed to differences in population characteristics and diagnostic approaches. We observed a significant proportion of bilateral deformities, with 77% of patients exhibiting this feature. This prevalence is consistent with findings by Byrd and Jones (2009) [14]. Despite the high prevalence of FAI in our cohort, only 10% of hips were symptomatic, and 62.7% of these painful hips exhibited FAI morphology. No significant association was found between radiographic morphology of FAI and groin pain, aligning with results from Hasegawa et al. (2020) [5]. This suggests that while FAI is common, its direct link to pain and degeneration may need further investigation. Our study revealed that the most common radiographic finding of FAI was an abnormal lateral center-edge (LCE) angle, indicating acetabular over-coverage (32.6%), while the crossover sign, an indicator of acetabular rotation abnormality, was the least common (6%). This is in contrast to previous study which identified the crossover sign as the most prevalent radiographic finding in similar population groups [1]. Derived high prevalence of radiographic morphology of FAI in both symptomatic and asymptomatic individuals provide substantial evidence regarding the pervasive and progressive nature of this developmental disorder. Nontreated pathological changes of FAI can decrease work capacity, quality of life and independency of affected individuals. Current study presents FAI as a major cause of developmental hip pain in adult Indian population. Further prognostic evaluation of affected population is necessary so as to formulate a universal classification and grading system for this diagnosis. In athletes and individuals having physically demanding occupations, FAI develops insidiously and naturally courses into hip osteoarthritis at rates swifter than the normal population. Negative calcium bone metabolism causes similar changes overtime even in sedentary individuals. Primary clinical diagnosis and treatment of FAI is need of the hour for the existent Indian population. Clinicians require to maintain a high degree of suspicion in order to timely and correctly manage this developmental disorder of adults, in order to limit future morbidity and disability.

Role of pincer deformity in the development of osteoarthritis remains unclear, with some studies suggesting a protective effect [15]. Cam deformity, on the other hand, is known to be a significant risk factor for groin pain, though not all cases of cam deformity led to symptoms or osteoarthritis [16]. Studies have identified additional morphologies beyond what standard radiographs can detect, making CT scans increasingly important for FAI assessment [17]. The lateral center-edge angle (LCE angle) is often used to identify pincer morphology, but its interpretation varies, with most studies suggesting an abnormal angle is greater than 40° [18]. Advanced imaging techniques, including CT scans, are becoming essential in preoperative planning and diagnosis, but methods for measuring LCEA need further validation [19]. Our research compared alpha and LCE angles on radiographs and CT scans, showing higher maximum alpha angles and mean LCE angles than those in previous studies [20]. While CT scans offer clear depictions of bone deformities, they come with drawbacks such as higher radiation exposure and costs. MRI, while useful for visualizing anatomical structures, lacks the three-dimensional reformatting capabilities of CT [20]. Three-dimensional imaging can enhance diagnostic accuracy, but radiographs are still commonly used, despite their limitations. Future assessments might benefit from integrating various imaging techniques and accounting for pelvic tilt [21]. Present study highlights dominant etiological factors found associated with FAI. Symptomatic patients with radiographic morphology of FAI reported history of adolescence trauma to the hips, increase in groin pain with rise in age, body height and body mass index. Pathological investigations revealed vitamin D insufficiency and rise in markers of bone resorption such as serum alkaline phosphatase. Clinical examination

revealed osteopenia and osteoporosis related bony pains that were differentiated using bone mineral densitometry in older patients. Lifestyle related factors such as prolonged squatting, repeated single leg standing or jumping, physically demanding occupations such as police, army, shoe factory workers, manual labourers and competent endurance training for sports were readily evident as correlated causal factors and suggested towards the acquired nature of this deformity. Certain patients did report presence of similar symptoms in family members and siblings sharing blood relations and lifestyle. Genetic basis of this disease cannot be ignored and attracts future research [22].

Conservative approach of management has been studied and validated in global researches for FAI. Regular and prolonged adherence to postural correction, lifestyle modification and guided resistance training protocols lead to comfortable complete recovery of FAI patients [23]. Inclusion of core strengthening exercises along with resistance exercises of hip musculature is deemed necessary for restoration of biologically healthy pelvic anatomy [24]. Gait training focuses on maintenance of normal speed gait with decreased stride length and increased ankle push off at terminal stance phase with erect spinal posture, in order to stabilize hip joint reactive forces at the terminal range of motion [25]. Overuse or over training of FAI effected hip can cause muscle soreness, joint effusion and pain inhibition. This is solely preventable by vigilant counselling of both patients as well as training physiotherapists, guiding them to strictly promote adherence to prescribed gradually progressive resistance training program, defined safety protocols while performing overactivity and inclusion of sufficient rest periods in between exercises. Regular resistance training periods and walking sessions are included in daily routine in order to preserve sustainability and strength of hip joint biomechanics with advancing age.

Significance of this study is augmented by achievement of excellent intra- and iter-observer reliability and repeatability of GeoGebra software based radiographic hip angle measurements. Evidence regarding higher than existent prevalence of asymptomatic FAI radiographic morphology and its association with groin pain in symptomatic patients is clear and present. In comparison to similar population-based prevalence studies conducted globally, higher values are obtained in current study involving homogenous Indian population of mixed urban and rural backgrounds. Still prevalent malnourishment, osteopenia, low socio-economic status and sedentary lifestyle have causal etiological association as evident by significantly improved hip scores demonstrable after modifying these risk factors through monitored conservative treatment. Clinically, young adult males present with cam type FAI deformity after regular overloading of hip joint with abnormal reactional forces. Older adult males display development of concomitant pincer morphology. On the other hand, adult females predominantly present with mixed type FAI. Neglected and misdiagnosed FAI can naturally course into advanced primary hip osteoarthritis with limitation of range of motion and femoral neck stress fracture on trivial injury in asymptomatic population with radiographic morphology of FAI. Clinically disabling nature of FAI in symptomatic population raises an alarming bell for clinical intervention in the asymptomatic population with radiographic morphology of FAI. Regular trivial trauma sustained to the susceptible hip during daily activities by the latter can eventually lead to progression of the developmental pathology of FAI. Increase in the values and number of radiographic morphological signs of FAI present in an asymptomatic hip naturally increase gradually overtime if activity modification is not initiated. Basically, early recognition and treatment of this pathology can surely halt its progression. Reversal of the radiographic morphology on further continuous conservative interventions is a topic for future research in this peculiar patient group.

Our study has limitations, including challenges in precisely measuring anterior head-neck offset because of varying positioning of amplification indicator. We did not analyse the acetabular index or os acetabuli, and our reliance on radiographs, while cost-effective, limited the accuracy of alpha angle measurements compared to CT or MRI. The single-center study design may introduce selection bias, and the low occurrence of groin pain limited our evaluation of symptomatic FAI. Future research with larger, more diverse populations and advanced imaging is needed to address these limitations and better understand FAI's progression to osteoarthritis. FAI is a chronic hip disease that develops over time due to repeated microtrauma to the intra and juxta-articular structures. The inflammatory and pathological changes of FAI create intraarticular stress areas that might add up with concomitant bony weakness present to end up in creating an intraarticular femoral neck fracture occurring on trivial falls. Further long-term prospective longitudinal follow-up studies of these patients are necessary and planned in order to reveal the natural course and modifiability of this structural abnormality.

Conclusion.

Our study reveals a high prevalence of Femoroacetabular impingement (FAI) in the Indian population, with 73% of hips exhibiting radiographic signs of FAI. Notably, only 10% of hips experienced groin pain, suggesting that structural abnormalities are widespread even among asymptomatic individuals. 62.7% of painful hips showed radiographic morphology of FAI that was validated on CT scans. These findings highlight the need for comprehensive screening and precise imaging, such as CT imaging, to accurately diagnose and monitor FAI. Causal etiological association found out can successfully guide future self-preventive measures required to prevent development of this musculoskeletal disease in young adults. Continuously monitored conservative management shows encouraging results with possible pain free survival. Ethnic or regional variations in FAI prevalence underscore the importance of tailored diagnostic approaches. Long-term follow-up and further research are crucial to understand the progression of FAI to osteoarthritis and to evaluate preventive interventions.

Conflict of Interest.

The authors declare that they have no conflict of interest.

Compliance with Ethical Standards.

All procedures performed in studies involving human participants were in accordance with the ethical standards of

the institutional ethics committee in compliance with the 1964 Helsinki Declaration and its later amendments.

Informed Consent.

Informed consent was obtained from all individual participants included in the study.

Statement of Human and Animal Rights.

This article does not contain any studies with animals performed by any of the authors.

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ფემოროაცეტაბულურიიმპინგმენტი:რადიოლოგიური მორფოლოგიის გავრცელება ინდოეთის პოპულაციაში, ეტიოლოგია და კლინიკური მართვა

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რეზიუმე

შესავალი: ფემოროაცეტაბულური იმპინგმენტი (FAI) ხშირად შეუმჩნეველი მიზეზია თეძოსა და საზარდულის

ტკივილისა მოზარდებსა და მოზრდილებში. თუ არ მოხდება მისი მკურნალობა, ის ადრეული პირველადი ბარძაყის სახსრის ოსტეოართრიტის წინამორბედია. ინდოეთის მოსახლეობაში მუცლის ღრუს არტერიების ინფექციის გავრცელება არასაკმარისად არის დოკუმენტირებული. ამჟამინდელი კვლევის მიზანია მუცლის ღრუს არტერიების დაზიანების რენტგენოგრაფიული მორფოლოგიის გავრცელების დადგენა შემთხვევით პირებში, რომლებსაც ჩაუტარდათ მენჯის რენტგენოგრაფია მესამეული ჯანდაცვის რეფერალურ საავადმყოფოში და გააანალიზოს მასთან დაკავშირებული საზარდულის ტკივილი, ეტიოლოგიური ფაქტორები და კლინიკური მართვა.

მეთოდები: ამ დაკვირვებით ჩატარებულ კვლევაში მონაწილეობდა 18-დან 50 წლამდე ასაკის 550 პაციენტი. მენჯის რენტგენოგრაფიული სურათები პერსპექტიულად გაანალიზდა მუცლის ღრუს არტერიების დაზიანების ნიშნების დასადგენად. საზარდულის ტკივილი შეფასდა არაართრიტული ბარძაყის სახსრის ქულით (NAHS). ბარძაყები კლასიფიცირდა არსებული რადიოლოგიური დარღვევების და სიმპტომური საზარდულის ტკივილის რაოდენობის მიხედვით. კლინიკური სიმპტომების მქონე პაციენტები გამოკვლეული იქნა კომპიუტერული ტომოგრაფიის (CT) სკანირებით და კონსერვატიულად იმართნენ. ეტიოლოგიური რისკ-ფაქტორების ანალიზისთვის გამოყენებული იქნა მრავალვარიანტული ლოგისტიკური რეგრესიული ანალიზი.

შედეგები: მუცლის ღრუს დაზიანების რენტგენოგრაფიული მორფოლოგია გავრცელებული იყო სულ 453 პირში (82%) და 803 პირში (73%). მათგან 350 პირში (77%) იყო ორმხრივი და 103-ში (23%) - ცალმხრივი დაზიანებები. კვლევის პოპულაციის საშუალო ასაკი, რომელიც შედგებოდა შერეული ქალაქ-სოფლის ეთნიკური წარმომავლობისგან, იყო 32.3+17.8 წელი. მამრობითი და მდედრობითი სქესის თანაფარდობა იყო 2:1. გვერდითი ცენტრი-კიდის კუთხე ყველაზე ხშირი ნიშანი იყო (32.6%), ხოლო გადაკვეთის ნიშანი ყველაზე იშვიათი (6%). პინსერის მორფოლოგია დომინანტური ნიშანი იყო (36.2%), შემდეგ შერეული (22.8%) და კამ (13.5%). მათ შორის, მხოლოდ 110 თეძოს სახსარში (10%) კლინიკურად აღენიშნებოდა ტკივილი (NAHS საშუალო ქულით 87.4), საიდანაც 69 თეძოს სახსარში იყო მუცლის ღრუს ანთებითი დაავადების მრავლობითი რადიოლოგიური მორფოლოგია, რომელიც მნიშვნელოვნად უკავშირდებოდა კომპიუტერული ტომოგრაფიის მონაცემებს. შედეგის მნიშვნელოვანი კავშირი (p-მნიშვნელობა <0.05) გამოვლინდა დემოგრაფიულ პარამეტრებთან, საწყის მახასიათებლებთან და მრავალ ეტიოლოგიურ ფაქტორთან.

დასკვნა: მუცლის ღრუს ანთებითი დაავადების რენტგენოგრაფიული მორფოლოგია გავრცელებულია შესწავლილი ინდოელი პოპულაციის 82%-ში და თეძოს სახსრის საერთო რაოდენობის 73%-ში. ეს მონაცემები ზუსტად დადასტურდა კომპიუტერული ტომოგრაფიით სიმპტომური პაციენტების 10%-ში. გამოვლენილი მიზეზ-ეტიოლოგიური კავშირი წარმატებით განსაზღვრავს ახალგაზრდებში ამ კუნთოვანი დაავადების განვითარების თავიდან ასაცილებლად საჭირო სამომავლო თვითპროფილაქტიკურ ზომებს. გრძელვადიანი კონსერვატიული მართვა აჩვენებს წამახალისებელ შედეგებს უმტკივნეულო გადარჩენის შესაძლო შესაძლებლობებით.

საკვანძო სიტყვები: ბარძაყის სახსრის იმპინგენტი; პინსერის მორფოლოგია; კამ მორფოლოგია; ახალგაზრდა პოპულაცია; ოსტეოართრიტი; მენჯის რენტგენოგრაფიები