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Research Article

Preliminary Study of Microlithic Tools from Brihaspati Kund, Panna, Madhya Pradesh

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Abstract

The present study investigates the microlithic assemblage discovered at Brihaspati Kund, located on the border of Satna–Panna district in Madhya Pradesh, Central India. The site lies within the Vindhyan geological formation and is characterised by sedimentary rocks, river valleys, and diverse ecological conditions that were favourable for prehistoric human occupation. Systematic field surveys conducted in 2022 revealed a rich concentration of lithic artefacts, including flakes, cores, bladelets, microblades, scrapers, points, and debitage, recovered primarily from surface contexts over an area of approximately 21 hectares. A total of 808 stone artefacts were analysed using standard typological and morphometric approaches. The assemblage shows dominance of chert as the primary raw material, followed by quartz and agate, indicating selective material procurement based on tool efficiency and durability. Preservation analysis suggests that a majority of artefacts are in fresh condition, supporting the interpretation of the site as a primary lithic production and reduction locale rather than a secondary depositional context. Technological evidence indicates the use of both direct percussion and pressure flaking techniques, along with evidence of core reduction strategies and hafting practices. The presence of diverse tool types reflects a complex behavioural adaptation of Mesolithic hunter-gatherer groups. The study contributes to understanding prehistoric settlement patterns, lithic technology, and resource utilization in Central India during the Mesolithic period.

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1. INTRODUCTION

In Brihaspati Kund – Geology & Geomorphology

The Brihaspati Kund (24° 50.619'N 80° 29.227'E) is a natural crater located in the Majhagawan Tehsil of Satna district, on the border of Satna – Panna district. It is located at a distance of around 33km southwards of Kalinjar fort.Geologically, the region contains sedimentary rock, which is one of the oldest rock formations of the Vindhya and especially located in elevated track of the district. The ranges never raise more than a few hundred meters above the surrounding plains and have a maximum width of around 80 km. The hills in central India have a number of depressions in major valleys due to geological formation and river action (Sinha 1994: 12). The area lies on the Vindhyan plateau, which extends from the Kaimur hill range in the south to the edge of the Ganga valley in the north. It is traversed by three prominent hill ranges from south-south west to north-north east and is occupied by a higher plateau in the south-western part of the district known as "Parasmania Pahar" which is part of Bhander series (District Ground Water Information Booklet – Satna 2013: 7). A number of small water sources of this region originate from its southern slopes and running towards north. One major river Ken or ancient Karnavati, formed the Ken valley and finally merges with river Betwa. Besides that, Baghain, Pattne, Alone and Kilkila are other important perennial water channels running in this area (Dehuri and Pradhan 2018: 125). The Baghain river which runs through the Brihaspati Kund is said to have its source in a hill in Panna district. It then enters UP, in Banda district and flows
in a north-east direction, separating the district from Chitrakoot district, before it meets the Yamuna. The Baghain brings with it little alluvial soil but it often deposits a large amount of sand near its junction with the Yamuna. The flora of this region consists largely of stunted teak and thick small tree and scrub jungle of species of *Grewia, Zizyphus, Carisa, Woodfordia, Flueggea, Phyllanthus, Capparis, Acacia, Anogeissus, Terminalia, Boswellia, Butea, Bassia, Diospyros,* and others (Frowde 1908: 399). Madhya Pradesh is rich in mammalian biodiversity. The carnivore guild is large, consisting of the tiger (*Panthera tigris*), leopard (*Panthera pardus*), sloth bear (*Melursus ursinus*), dhole (*Cuon alpinus*), striped hyena (*Hyaena hyaena*), jackal (*Canis aureus*), wolf (*Canis lupus*), jungle cat (*Felis chaus*), wild cat (*Felis silvestris*), rusty spotted cat (*Prionailurus rubiginosus*), smooth coated otter (*Lutra percspicillata*), Indian grey mongoose (*Herpestes edwardsii*), ruddy mongoose (*Herpestes smithii*), common palm civet (*Paradoxurus hermaphrodites*) and oriental civet (*Viverricula indica*). While the ungulate guild is comprised of gaur (*Bos gaurus*), nilgai (*Boselaphus tragocamelus*), sambar (*Rusa unicolor*), chital (*Axis axis*), barking deer (*Muntiacus muntjac*), blackbuck (*Antilope cervicapra*), four horned antelope (*Tetracerus quadricornis*), chinkara (*Gazella bennettii*), mouse deer (*Moschiola indica*) and hard ground barasingha (*Rucervus duvaucelii branderi*) (Jhala et al. 2016: 8). The climate of this region which lies in Satna district is characterized by a hot summer with general dryness, except during the south-west monsoon season. The year may be divided into four seasons. The cold season from December to February is followed by the hot season from March to about middle of June. The period from the middle of June to September is the south-west monsoon season. October and November form the post-monsoon or transition period (District Ground Water Information Booklet – Satna 2013: 6). The normal annual rainfall of Satna district is 1092.1 mm. The district receives maximum rainfall during south-west monsoon period (i.e., June to September) and about 87.7% of annual rainfall is received during this period. Only 12.3% of the annual rainfall takes place between periods October to May. Rainfall forms the sole source of natural recharge to ground water regime and the rain water is available for recharge to ground water is mainly during south-west monsoon period only (District Ground Water Information Booklet – Panna 2013: 6).

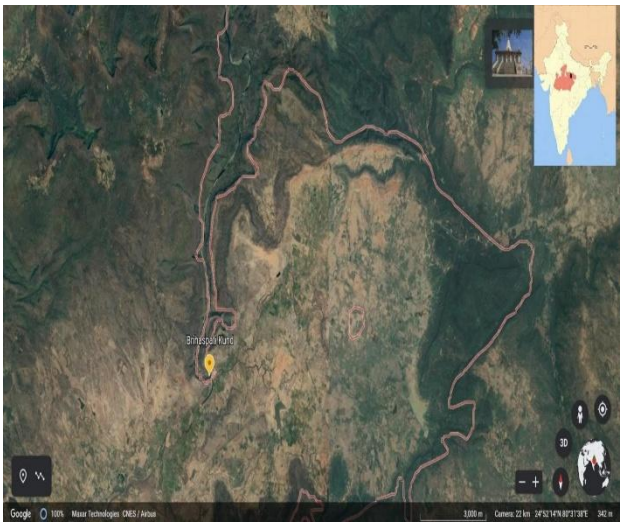

Figure 1: Satellite View of Brihaspati Kund location in Panna District.

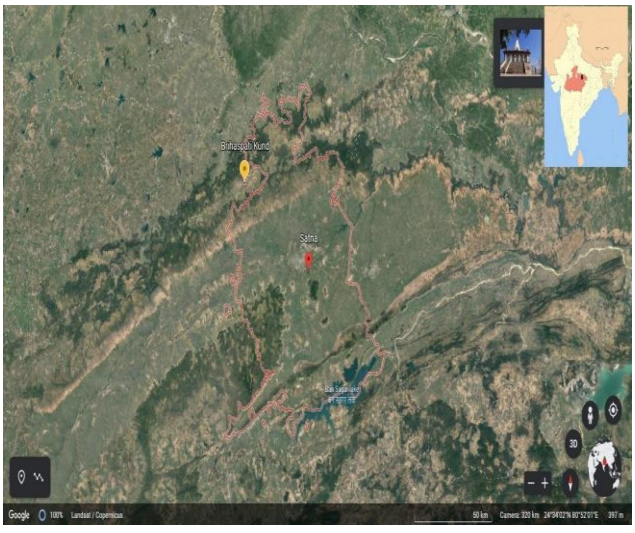

Figure 2: Brihaspati Kund located on the border of Panna – Panna District

History of the Mesolithic prehistoric

Understanding prehistoric habitations in the South Asian subcontinent has benefited greatly from knowledge of Indian prehistory, which has produced a wealth of data from all eras of prehistoric history. The prehistory of India, according to prehistoric artefacts and textual archaeological data, began 1.5 million years ago and persisted through the Mesolithic and Neolithic periods (Deo and Rajguru, 2014). In comparison to three continents that had the highest rates of microliths production, such as Howiesons Poort in southern Africa and Bondaian in eastern Australia, India had one of the earliest microliths industries during the Microlithic periods (Hiscock et al. 2011). Conventionally, microliths are regarded to be the distinguishing feature of Mesolithic culture, and their appearance on the Indian subcontinent.

Since numerous lithic assemblages and faunal remains have been found at numerous excavated and investigated prehistoric sites throughout Central India, this region is well known for its prehistoric settlement (Mohanta, 2017; Singh, 2018; Khatri, 1962; Mishra, 2006–07). Meanwhile, numerous rock shelters, some of which contain paintings and engravings, have also been found and studied by different academics from this region of India (Math pal, 1984; San Kalia H. D., 1974; Wamankar and Panday, 1996; Gupta, 1984; Bajpai, 1964, 1996; Banerjee, Varma and Pike, 2015; Chadar, 2015; Allchin and Allchin, 1968; Misra, 1965; Rajan and Joshi, 1958).

The present study area belonging to the prehistoric period is located on the border of the Satna - Panna district of Madhya Pradesh which is also a part of Central India. The ecology, topography, and natural resources of Central India are said to have created an ideal scenario for the prehistoric inhabitant. According to numerous scholars, these prehistoric groups used more than a dozen sites in this area due to the adaptability of the landscape. The Palaeolithic, Microlithic, and rock art cultures are connected to these. Numerous investigations into prehistoric archaeological artefacts have shown that microlith assemblages are typically connected to Mesolithic prehistoric cultures (Deo and Rajaguru, 2014; Mishra, 1965, 1989).The microlithic site assemblage near Brihaspati Kund was discovered during the field exploration in April, 2022 and the main objective of the present study was to investigate the site for lithic assemblage and to focus on understanding the typo-technological character of lithic assemblage with morphometric analysis

Site Stratigraphy & Method of Study

The exploration was conducted by the author two times in in the year 2022, first during the month of April and later after the monsoon in September around the region of Brihaspati Kund. The exploration yielded rich evidence of microliths with debitage from the surface. The site of artefacts yielding region is located near the region where the Baghain river runs through the Brihaspati Kund, whose source is said to have in a hill in Panna district. The assemblage was collected through the grid method; clusters of artefacts were collected and kept separately and random surface collection was done in the region. The site has a very small deposition of soil layer and the bedrock is easily identified in the region. Due to the less depositions of soil very few sections were identified and it was observed in order to understand the geological context of the artefacts. The artefact bearing horizon is found upon brown sandy silt layer which is present directly upon the bedrock. The artefact layer is also covered by a layer of brown – yellow sandy silt layer upon which is the top soil or the humus layer. During the survey two grids were plotted for the collection of artefacts, one of 1m and another of 2m. Apart from this grid collection, at some other places in the region artefacts that were identified in a cluster in an area ranging from 1-2m radius was kept separately as named accordingly as Cluster 1, Cluster 2 and so on till Cluster 5. After which random surface collection of artefacts were done in the area of around 21 hectares.

Figure 3- Grid taken for Lithic collection

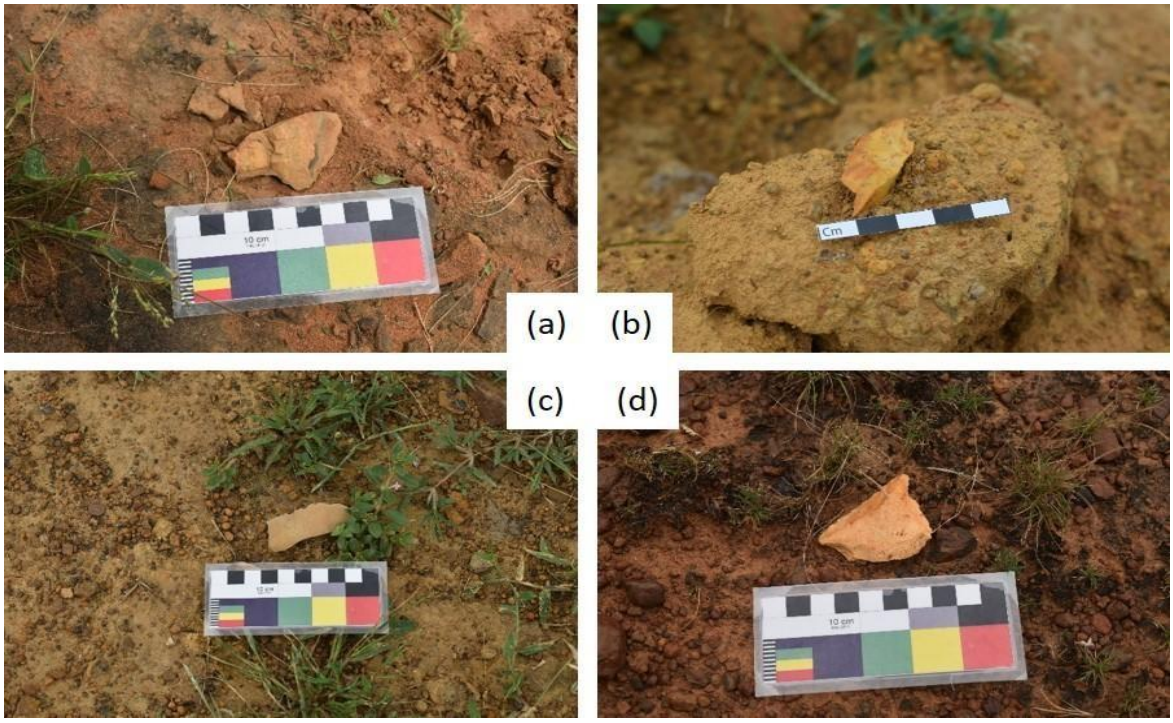

Figure 4 - Lithic tools found during survey

The assemblage was classified using standard typological schemes of the flake and core components. Morphological attributes were recorded for all the artefacts, however, for the flakes and cores, metrical analysis was also recorded. These attributes include length, width, thickness, etc. The attributes selected for measurement are borrowed from the methods of Clarkson et al. (2009) A table representing the list of attributes that have been recorded for different artefacts have been shown below (Table - 1).

Table 1: List of Attributes

Tools	Cores	Unretouched Flakes	Retouched Flakes	Flaked Piece
Typology	Amorphous Core, Chisel ended Core, Cylindrical Core, Discoid Core, Flake Core, Microblade Core, Radial Core, Pyramidal Core	Flakes, Bladelet, Microblade, Prepared Core Flake	Retouched Flake, Backed Blade, Blade, Bladelet, Flake Blade, Borer, Lunate, Microblade, Notch, Point, Notch cum Scraper, Side Scraper, End Scraper, Side & End Scraper, Tanged Scraper, Convex Scraper, Double Side Scraper, Double Side & End Scraper	Flaked Piece
Condition	Condition	Condition	Condition	Condition
Raw Material	Raw Material	Raw Material	Raw Material	Raw Material
Patination	Patination	Patination	Patination	Patination
Length	Length	Length	Length	
Width	Width	Width	Width	
Thickness	Thickness	Thickness	Thickness	

Apart from the above listed tool types, core nodules and debitage were also separated during the classification and recorded.

Lithic Analysis: A total of 808 stone artefacts were collected during the exploration, all of which have been taken into account while classifying the collection of Brihaspati Kund, Panna district, Madhya Pradesh. A quantitative analysis table (Table 2,) of the assemblage is shown below:

Raw Material:

The raw material plays a vital role in the production of stone tools (Jayaswal, 1970) and their functionality also depends on the quality or condition of the raw material. The prehistoric groups utilized a variety of raw materials for manufacturing the artefacts. In the present study area, we have also recovered several types of raw materials that were used by prehistoric habitants for the production of stone tools. These raw materials are agate, quartz, chert, jasper, chalcedony and fine-grained sandstone. The analysis of these artefacts revealed that the most dominant raw material used in this site was chert, as among the collected artefacts 672 assemblages are of this type, which made an 83.2% contribution of total assemblage. Second most used raw material is quartz as out of 808 assemblages, 48 assemblages are made on this, which makes a contribution of 5.94% to total lithic assemblages. The third most used raw material was agate, 43 assemblages were made of this material, which makes a contribution of 5.32% to the total assemblage. Other raw materials recognized as chalcedony, fine grained sandstone and jasper and these made a contribution of 1.23%, 4.2% and 0.12% respectively. Microliths are very small and thin lithic artefacts that were utilised by Upper Palaeolithic–Mesolithic hunter–gatherers in prehistoric times. Agate, chert, chalcedony, jasper, and quartz are the hardest varieties of stones; thus, they chose to use them as their raw material because of the durability of stone. The Mohs scale indicates that the hardness of these raw materials is between 6.5 and 7.0, demonstrating the prehistoric hunter-gatherer society's knowledge of the raw resources (Patel and Farswan, 2022).

Preservation of Artefacts:

During the course of analysis, the assemblage was classified on the basis of preservation of artefacts, i.e., fresh or rolled. A large portion of the assemblage was found to be fresh and contributes 81.55 % of the assemblage. The rolled artefacts contribute 18.44% of the assemblage. This suggests that the artefacts would have been prepared in the same context and it could be the primary site of tool production.

Table 2: Quantitative Analysis of Preservation of Assemblage

Typology	Fresh	Rolled	Total
Flakes	386	74	460
Cores	173	12	185
Flaked Piece	92	57	149
Core Nodule	6	1	7
Debitage	2	5	7
Total	659	149	808
Total %	81.55	18.44	100

Typological Analysis of Total Assemblage:

The total assemblage of stone artefacts that has been collected during the field exploration around the Brihaspati Kund has been classified broadly under five major categories. These are (A) Flakes, (B) Cores, (C) Flaked Pieces, (D) Core Nodules and (E) Debitage.

These major categories are further subdivided into different tool categories based on their typological features (Mishra and Nagar, 2009). In the present study, the author has divided the flakes into two broad classes: (I) Unretouched, and (II) Retouched.

Flakes Unretouched

Under this category, those flakes which doesn't show any sign of retouching have been kept from the total assemblage. It includes the simple flakes which dominates the unretouched category and constitutes 60% with 118 artefacts of different raw materials.

The Flake Blade:

A flake blade neither essentially have a parallel margin, nor are they certainly at least twice as long as width, they are usually end-struck off cores (Kipfer, 2007). Under this category one artefact was identified, which constitutes 0.12% of the total assemblage (Table 2). It is made up on chert as raw material.

Borer:

According to Sankalia (1964) a borer is a tool with retouches on its thick projecting point. This borer is naturally a point because side notches are deliberately made on the sides of flake or nodule. It can be with a small projected tip or sometimes like an elongate point. Borer could be prepared in any shapes, circular, square, rectangular or even made on worked or unworked cores. According to Misra and Nagar (2009), these are usually steeply retouched on their distal end along both the lateral margins to produce a long, narrow, sturdy and pointed projection which could have been used for boring holes in animal hides, wood and other relatively soft materials.

Lunate:

Lunate or also known as crescents are geometric tools which are made on narrow bladelets and sometimes on small flakes, by more or less steeply blunting one lateral margin and giving it a curved shape (Mishra and Nagar, 2009).

Under this category, a total of 7 artefacts were identified which constitutes 0.86% of the total assemblage (Table 2). These lunates are made on chert as raw material.

Microblade:

During the course of this analysis, microblade are classified as those flakes whose length is less than 50 mm and it has parallel side lateral margins. Under this category, a total of 41 artefacts were identified which constitutes 5.07 % of the total assemblage (Table 2). These microblade are made upon found to be made upon chert as the highest, then chalcedony and agate from the assemblage

Notch:

A notch is a type of flake that has a tiny scrapping edge which was most probably utilized for scrapping small diameter shafts used for various kinds of weapons (Mishra and Nagar, 2009). Under this category, a total of 20 artefacts were identified which constitutes 2.47 % of the total assemblage (Table 2). These were found mostly on flakes made up of chert as raw material.

Point:

A point is a category of stone artefact containing a pointed tools flaked on distal or proximal end. These tools can be used either

as a weapon or for other purposes such as stabbing or piercing (Kipfer, 2007).

Under this category, a total of 44 artefacts were identified which constitutes 5.44 % of the total assemblage (Table 2). These points were made upon mostly chert and then agate as raw materials.

Scrapers:

Scrapers are the widely distributed artefact in the lithic assemblage. In fact, scrapers are the most common retouched artefact of the collection, which comprises the largest percentage under retouched tools, with 75 artefacts and constitutes 28.4 & under the retouched category.

According to Sankalia (1964), as the name shows, these tools are usually used for scraping objects such as tree barks, dressing of thin sticks or bamboo shafts and skinning of animals, etc. He named the tool as scraper according to the shape of a particular piece, and the position and nature of the edge for scraping. The key importance of the tool is the position and nature of the secondary retouch situated on the margins. Most of the scrapers are made on flakes or cores, rarely on blades, never on bladelets (Mishra and Nagar, 2009).

DISCUSSION

The Microlithic assemblage of Brihaspati Kund is both non-geometric and geometric, consists a variety of tool types. The lithic assemblage was found between the sandy silt layer, some of them associated with sandy silt layer as well. Due to very thin deposition of soil layer above the bedrock, it is hard to determine the exact time period when these soils were deposited and samples for OSL can't be collected from the location of artefact clusters. Variety of cores represented in the assemblage such as pyramidal, conical, cylindrical etc., does indicates diversity in core management. The cores were found mostly in fresh condition which does suggest that they were left in the same context after flake reduction and has not been washed off from any other region. Some of the chisel-ended cores do show flaking patterns which could most probably have been made due to the pressure flaking technique. The presence of eraillure scar on the flakes, also suggests that direct percussion method would also have been used in the site for flake reduction. For the direct percussion method either hard hammer such as hammer stone or soft hammer technique would have been used for chipping out microlithic tools. The presence of some of the cores that are very small in size do suggest high reduction of cores for flake reduction. Through the analysis of flakes, it was clear that most of them are fresh in nature, which could suggest us that the site of artefact finding could most probably be the site of production as well. This can also be supported by the presence of flaked pieces and debitage, as these artefacts would be identified near the sites where production of artefact is being done. Different values of dorsal cortex do also suggest us that different stages of flake reduction were done on the site. The presence of bending flakes in the assemblage does also support the use of pressure flaking technique. Apart from this the presence of large number of microblade and bladelets can also be chipped out of stone from pressure flaking technique as well as punching technique, also known as fluting technique. The presence of backed blades does support the presence of backing technique being used by the hominins of the site and they would have most probably been using hafting method as well. The presence of large number of points as well as few tanged artefacts can also support the hafting method. During the course of exploration in the region around Brihaspati Kund, an area of around 1000 hectares would have been explored which is bordered by different localities of rock shelters. But only the site of artefact which is around 20 hectares did give us the presence of lithic artefacts. This also helps us to suggest that it was the site of lithic reduction and artefact production and the hominis living in the surrounding area used to make tools at that place.

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