



Research Paper

Population data and Allele frequencies analysis of 17 Y-STR loci in Iraqi Arabs population

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ABSTRACT

Allele frequencies and population data for 17 Y-STR loci included in the AmpFISTR Y-filer PCR amplification kit (Applied Biosystems, Foster City, USA), that permit the simultaneous amplification of all the markers included in the actually used European “extended haplotype”, *DYS19*, *DYS189I*, *DYS389II*, *DYS390*, *DYS391*, *DYS392*, *DYS393*, *DYS385I/II*, *DYS438*, *DYS439* and also *DYS437*, *DYS448*, *DYS456*, *DYS458*, *DYS635* and *Y GATA H4*, were obtained from a sample of 78 healthy unrelated males of Arab Iraqis. A total of 78 unique haplotypes were identified, highest discrimination locus *DYS389I* was 0.999999931.

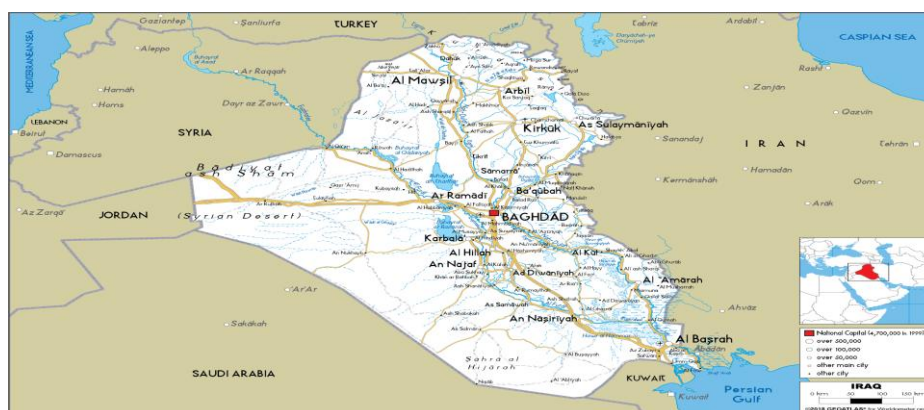
KEYWORDS: 17 Y-STR, Y-chromosome, Iraq, haplotypes, MLD, PCR.

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I. INTRODUCTION

Iraq is located in the Middle East at the northernmost extent of the Persian Gulf, north of Saudi Arabia, west of Iran, east of Syria, and south of Turkey. The total area of Iraq is 437,072 square kilometers, including 432,162 square kilometers of land surface. Ethnic Groups: In 2006 an estimated 75 to 80 percent of the population was Arab and 15 to 20 percent, Kurdish. Other significant minority groups, together constituting less than 5 percent of the population, were Assyrians, Chaldeans, and Turkmens^[1].



Purpose

In this study aimed to analyze the distribution of Y chromosome haplotypes in a sample of 78 from the main ethnic group in Iraq (Iraqi Arabs) males from different geographic regions of Iraq (mainly meddle and south) to know the bifacial of using this kind of multiplex YSTR in forensic and paternity cases^[2].

II. MATERIALS AND METHODS

1. Sampling

DNA samples were from 78 healthy, unrelated and consenting adults' males who were Iraqi nationals and identified themselves as Iraqi Arabs. Samples were collected with informed consent in different parts of

Iraq; the majority were from middle and south of Iraq. Blood samples were collected using finger lancets and stored on FTA1 Classic Card (GE Healthcare, Pittsburgh, USA) ^[3].

2. Extraction

Genomic DNA was extracted from buccal swabs using Chelex® 100 ^[4] and quantified in the 7500 Real-Time PCR System using Quantifiler® Y human male Quantification kit (Applied Applied Biosystems, Foster City, CA, USA).

3. PCR amplifications

The AmpFISTR® Yfiler® PCR Amplification Kit (Applied Biosystems, Foster City, CA, USA) is a short tandem repeat (STR) multiplex assay that amplifies 17 Y-STR loci in a single PCR amplification European minimal haplotype (DYS19, *DYS385a/b*, *DYS389I/II*, *DYS390*, *DYS391*, *DYS392*, *DYS393*, Scientific Working Group-DNA Analysis Methods (SWGDM)-recommended Y-STR panel (European minimal haplotype plus *DYS438* and *DYS439*) and Additional highly polymorphic loci: *DYS437*, *DYS448*, *DYS456*, *DYS458*, *DYS635* (Y GATA C4), and Y GATA H4. PCR was carried out in a 12.5 ml volume containing 0.5 ng DNA template, following the recommendations for the Y-filer™ kit ^[5].

4. Typing

The PCR products were separated using capillary - on an ABI 3500 XL Genetic Analyzer (Applied , Foster City, CA, USA) using denaturing polymer POP- 4. GeneScan 500 LIZ was used as the internal lane standard. The 17 Y-STR results were analyzed using GeneMapper HID v.1.4 (Applied , Foster City, CA, USA). Allele designations were determined by comparison of the sample fragments with those of ladders provided with the AmpFISTR® YFiler® Amplification kit ^[6]. Amplified fragment analysis and YSTR typing were carried out according to the quality assurance standards recommended on the use of Y-STRs in forensic analysis ISFG ^[7].

6. Analysis of data

Allele frequencies and Power of Discrimination for each locus were calculated by PowerMarker software v. 3.25 ^[8]

III. RESULTS AND DISCUSSION

The observed allele frequencies of 17 YSTR loci in Arab Iraqis population are summarized in Supplementary Table S1. A total of 112 alleles at these 17 STR loci were found with corresponding allelic frequencies ranging from 0.0005 to 0.5101. The number of alleles varied from 4 (*DYS391*, *Y_GATA_H4* and *DYS437*) to 33 (*DYS385a/b*). Upon analysis of the data *DYS389I* was found to be the most discriminating locus with 0.99999931 and The least discriminating locus was *Y_GATA_H4* with 0.264349628. Polymorphism information content PIC were highest value and lowest value seen at this locus (Supplementary Table S2).

IV. CONCLUSION

This study shows, alleles frequency of 17-YSTR in Iraqi Arab population and the beneficial of using this kind of multiplex in forensic and paternity cases due to the high discrimination power, we are recommending to increase the number of samples and number of loci to get more clear view about the diversity and distribution of these alleles in Iraqi population as well as doing similar studies to other populations in Iraq community to identifying population specific haplotypes between geographically close groups.

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Allele	DYS456	DYS389I	DYS390	DYS389II	DYS458	DYS19	DYS393	DYS391	DYS439	DYS635	DYS392	Y_GATA_H4	DYS437	DYS438	DYS448	DYS385a/b
8	-	-	-	-	-	-	-	-	-	-	0.0125	-	-	-	-	-
9	-	-	-	-	-	-	-	0.0123	0.0125	-	0.0125	-	-	0.3456	-	-
10	-	0.0246	-	-	-	-	-	0.5185	0.025	-	0.8375	0.037	-	0.5432	-	-
11	-	0.0123	-	-	-	-	0.037	0.432	0.6125	-	0.0125	0.7037	-	0.0617	-	-
12	-	0.1358	-	-	-	-	0.6666	0.037	0.275	-	0.075	0.1851	-	0.037	-	-
13	0.05	0.679	-	-	-	0.05	0.2345	-	0.075	-	0.05	0.074	0.0246	0.0123	-	-
14	0.425	0.1481	-	-	-	0.65	0.037	-	-	-	-	-	0.6543	-	-	-
14.3	-	-	-	-	-	0.0125	-	-	-	-	-	-	-	-	-	-
15	0.35	-	-	-	-	0.2	0.0246	-	-	-	-	-	0.2592	-	-	-
16	0.1125	-	-	-	-	0.0875	-	-	-	-	-	-	0.0617	-	-	-
17	0.05	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
18	0.0125	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0246	-
19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.2469	-
20	-	-	-	-	0.037	-	-	-	-	0.1265	-	-	-	-	0.5802	-
21	-	-	0.0123	-	0.0864	-	-	-	-	0.4683	-	-	-	-	0.1358	-
22	-	-	0.0864	-	0.2098	-	-	-	-	0.2025	-	-	-	-	-	-
23	-	-	0.582	-	0.1728	-	-	-	-	0.1392	-	-	-	-	0.0123	-
24	-	-	0.2345	-	0.1604	-	-	-	-	0.0253	-	-	-	-	-	-
25	-	-	0.0864	-	0.2345	-	-	-	-	0.0394	-	-	-	-	-	-
26	-	-	-	0.0246	0.0987	-	-	-	-	-	-	0.0987	-	-	-	-
27	-	-	-	0.0246	-	-	-	-	-	-	-	-	-	-	-	-
28	-	-	-	0.074	-	-	-	-	-	-	-	-	-	-	-	-
29	-	-	-	0.3827	-	-	-	-	-	-	-	-	-	-	-	-
30	-	-	-	0.358	-	-	-	-	-	-	-	-	-	-	-	-
31	-	-	-	0.1111	-	-	-	-	-	-	-	-	-	-	-	-
32	-	-	-	0.246	-	-	-	-	-	-	-	-	-	-	-	-
10,17.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0131
11,12	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0131
11,16	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0263
11,14	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0394
12,15	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0526
12,17.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0131
12,18	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0131
12,17.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0131
12,19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0131
12,17	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0131
12,14	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0263
13,16.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0394
13,19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.1315
13,20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0131
13,15	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0394
13,14	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0131
13,13	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0131
13,18	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.171
13,16	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0131
13,17	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0921
14,18	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0131
14,21	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0131
14,16	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0789
14,17	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0131
14,15.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0131
15,17	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0131
15,17.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0131
15,16	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0131
16,20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0131
16,19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0131
17,16	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0131
18,20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0131
19,19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0131

Table S1

locus	Power of discrimination PD	Polymorphism information content PIC
DYS389I	0.999999931	0.99984871
DYS392	0.999999927	0.99984375
DYS385a/b	0.999999912	0.99982839
DYS437	0.999998901	0.99939484
DYS448	0.999998901	0.99939484
DYS389II	0.99991004	0.994524
DYS390	0.999832823	0.99253504

DYS458	0.994187765	0.95598396
DYS438	0.957202718	0.88056064
DYS456	0.95498125	0.8775
DYS391	0.895514448	0.813376
DYS635	0.855716096	0.78069511
DYS439	0.577773364	0.62484375
DYS19	0.46448125	0.5775
DYS393	0.407644409	0.55564444
Y_GATA_H4	0.264349628	0.50480631

Table S2

ACKNOWLEDGMENT

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Ethical Clearance: The principles and the experimental protocol in this study was approved by the Medico-Legal Directorate, Ministry of Health, Baghdad, Iraq.

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Conflict of Interest: Nil

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