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Original article

Consanguinity and problems of hearing and speech among Libyan Population in Benghazi

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ABSTRACT

Benghazi represents Libyan population since it is a mixture of Libyan tribes from east, west and south of Libya. This study is carried out to investigate the prevalence of consanguineous marriage in sample of Libyan population in Benghazi city. In addition, we investigate the association between consanguinity and hearing and speech problems. A 699 of married couples who had 4248 offspring were randomly selected and interviewed to fill a questionnaire which was carefully designed. All the data was analysed using frequency distribution to determine percentages of consanguinity with different degree, and chi square test to compare consanguineous with non-consanguineous marriage. The prevalence of consanguinity in Benghazi was found to be 46% with a mean inbreeding coefficient of 0.0254. First cousin was the most common 40% type of consanguineous marriages. Deafness-dumbness, dumbness other hearing and speech Impairments were higher in offspring of first cousin than non-consanguineous marriage. Males have more deafness-dumbness, deafness than females, whereas females have more hearing and speech impairments than males. Genetic counselling is needed for risk due to consanguinity and its association with hearing and speech problems in Benghazi city population.

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1. Introduction

Consanguineous marriage is common in many parts of Libya like most of Arab Countries (Abdalsadiq, 2004). It is strongly associated with autosomal recessive disorders (Sothenberg, et al., 1999 Jaouad etal 2009, Mobarak et al 2018). Deafness and Dumbness are important health problems in Libyan population. (personal communication with Center of Deaf and dumb, Benghazi). Angeli et al (2012) reported that congenital hearing loss can be caused by genetic and non-genetic (acquired) factors and can be present at birth or developed later on life. Deafness and hearing impairments were found to be more frequent in consanguineous than non-consanguineous marriages (Bener et al 2007; Khbouri and Patton 2008). Approximately, 30% to 50% of profound childhood deafness cases were classified as genetic, while 40% as autosomal recessive and 10% fall under autosomal dominant (Bittles and Black, 2010), for example, in the United Arab Emirates 92% and 57% of cases of non-syndromic and syndromic deafness.

In Libya, Rhuma and her colleagues have studied recently the hyperoxaluria type 1 (autosomal recessive) in Tripoli, the patients had a significant level of consanguinity (81.1% of the patient), and most of the patients (61.3%) are males (Rhuma et al 2018).

Sex linked recessive deafness was estimated to account for 2-6% of male genetic deafness (Reardon, 1990). The analysis of variance conducted on the prevalence of deaf-mutism was based on males only with marked differences observed between the patterns of deaf-mutism in Hindus and Muslims (Bittles, et al., 2004). The non-genetic deaf mutism may caused by Rubella, hypoxia and preterm delivery or low birth weight (Gosavi and Vatsalaswamy, 2012). The objectives of this study are to determine the prevalence and type of consanguineous marriage in Benghazi city. In addition, to investigate the relationship between consanguineous marriage and hearing and speeches problems.

2. Materials and Methods

This descriptive, cross-sectional study was conducted in Benghazi. This study was approved by an ethics committee in the faculty of Biomedical Science, Benghazi University. Data on consanguineous marriages were collected using a simple questionnaire after applying the consent form for each sample. The total number of couples in this study was 699 have 4248 offspring. All 699 couples were selected randomly in different

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parts of Benghazi city and interviewed and completed questionnaires. Consanguineous marriage was classified by the degree of relationship between couples: first cousins (F=0.0625), second cousins (F=0.0156), third cousins (F<0.0039), far relation (same tribe) (F<0.0039) and non-consanguineous (F =0). The coefficient of inbreeding (F) was calculated for each couple and the mean coefficient of inbreeding (alpha) estimated for the population. According to our data defects of hearing and speeches offspring was classified into five levels based on intensity of the defect; deafness-dumbness, deafness, dumbness, hearing and speech impairments. Frequency distribution for different class of defects and degree of consanguinity were calculated using SPSS Program (2010). Data analysis was carried out by using Chi square to compare consanguineous non-consanguineous groups and males and females.

3. Results

Prevalence of consanguineous marriage

This study showed that rate of consanguinity marriages in Benghazi forms 46% of all marriages (Figure1). First cousin marriage was the most common type of consanguinity (69%). It is also consisting 40% of total marriage, whereas other type of consanguinity constitutes small proportion (6%). The average coefficient of inbreeding (F) was 0.0254 in the population studied.

Consanguineous marriage and defects

Results shown in figure 2 indicate that deafness-dumpness, dumpness, speech and hearning impairments were highly significantly different (p<0.001) between first cousin and non-consanguineous marriage, however no significant difference detected for deafness alone. Deafness and dumbness were doubled in offspring of first cousin marriage compared with non-consanguineous marriage. Dumbness and other hearing impairments were tripled in offspring of consanguineous marriage compared with non-consanguineous marriage. Other speeches impairments were drastically increased in consanguineous marriage offspring compared with non-consanguineous marriage. Total of male and female offspring in this study were 2174 and 2074, respectively and the total number of defected offspring is 76 of 4248 (1.79 %), where defected children who were found within related couples forms 57 of 2087 (2.73 %) while number of defected offspring within unrelated people is 19 of 2160 (0.88 %). Although we have a 2% of each second, third and far relationship, but all the defect cases were appeared within just the first degree.

Sex linked defects

Males are significantly different (p<0.05) in deafness-dumbness and deafness than females (figure 3), in contrast to hearing and speech impairments where females are highly significant Than males. However, non-significant difference was found between males and females for dumbness.

Figure 1: Percentage of different type of Mating in Benghazi city.

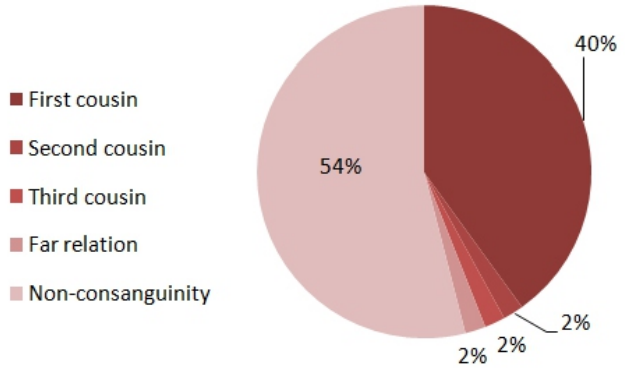


Figure 2: Number of defected offspring for first cousin and non-consanguineous marriages; number with different superscripts are significantly different from each other (p<0.001).

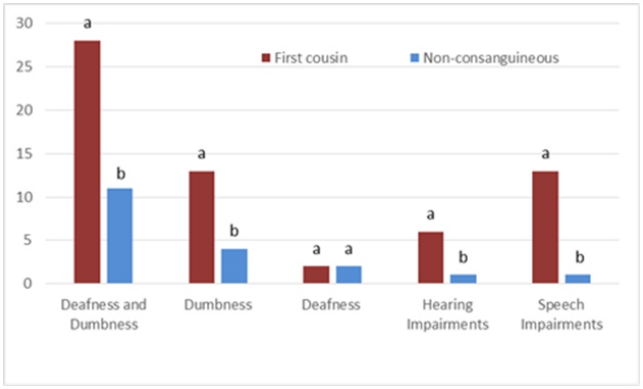
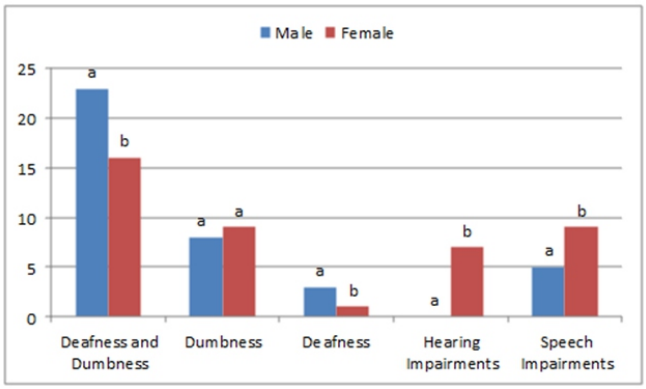


Figure 3: Number of different defects according to sex; number with different superscripts are significantly different from each other (p<0.05).



4. Discussion

The rate of consanguineous marriage is showed to form about 46% in Benghazi. This result lies within a range that is given to rate of marriages in Arab societies, 15.25 % in Morroco (Jaouad et al 2009) and 54 % in Qatar (Bener et al 2006). However, our estimate very close to that one in Yemen population 44.7% (Abdallah et al 2004). First cousin degree was most common type (40%) of consanguinity marriages, whereas other type of consanguineous marriages constitutes about 6%. This result also in agreement with those obtained in Arab populations (Zakzouk et al 1993; Radoranvic et al 1999; Bener an Alali 2006 ; Hamamy et al 2007; Bener et al 2007; Rabah et al 2011; Yamamah et al 2013). The estimate of mean of inbreeding coefficient α was quite higher 0.0254 compared with those estimates in Morocco, 0.0065 (Jaouad et al 2009), Tunisia, 0.0108 (Ben Arab et al 2004) Egypt, 0.01845 (Yamamah et al 2013) and Lebanon, 0.0161 (El-Kheshen and Sadat, 2003) and very close to one in Syria, 0.0236 (Othman and Saadat 2009) Qatar, 0.0237 (Bener et al 2007) and Yemen, 0.0244 (Abdallah et al 2004). The higher estimate of inbreeding coefficient in Benghazi population might increase the risk of occurrence of recessive disorders and must be considered during genetic counselling process. This type of marriage in Arabic country like Libya might be attributed to strength of social relationships inside the Libyan families which lead to increase first cousin marriages, also financial issues play a role to keep the wealth within same tribe, low awareness with negative health effect of consanguineous marriage, low education and Bedouin origin.

Many of studies indicate that consanguinity marriages are risk factors to increase number of children with deafness and/or dumbness in a population (Ben Arab et al, 2004; Yoong et al, 2005; Sajad et al, 2008; Khabori and Patton 2008). Angeli et al 2012) reported that marriage between first cousins favour recessive type of deafness. Our results in agreement with those studies. However, most of defected people in our study have the syndromic type of deaf, 35.52 % compared with non-syndromic deaf 2.63 %. Angeli et al (2012) indicated that inherited syndroms such as down syndrome, Usher syndrome, Treacher Collins syndrome Crouzen Syndrome, Alport Syndrome and Waardenburg syndrome include hearing loss as part of syndrome.

Deafness-dumbness and deafness were more in males than females this might be partially due to sex linked effect, which in agreement with results obtained by (Reardon, 1993; Bittle et al, 2004; Rhuma et al 2018). In contrast to hearing and speech impairments which higher in females than males. This might be due to that female are more sensitive to environmental factors causing hearing and speech impairments than males. And partially could be attributed to mitochondrial type of inheritance as indicated by Angeli et al (2012).

5. Conclusion

Consanguinity is a prevailing problem in Benghazi although it is considered as mixture of Libyan population tribes. The consanguineous marriage was accompanied by more frequency of hearing and speech problems compared with non-consanguineous marriage. Specific health education, and genetic counselling in particular, are needed to explain the consequences of consanguinity to the general population and to help couples make informed choices and to increase public awareness about genetic risks associated with consanguineous marriage.

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