Genetic Counseling as a key for Birth Defects & Genetic Disorders Prevention.

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Aim of genetic counselling

To reduce the incidence of genetic disorders in the population

Aim of prenatal diagnosis

-To confirm the normality of the fetus at risk for a genetic or congenital severe disease.

-To alert parents about their affected fetus status.

- Ethical consideration : choice freedom

Genetic counselling

Prenatal screening

Preimplantation diagnosis

Prenatal diagnosis

Evaluate the impact of genetic counseling on population?

Study population behavior trough

-union type choice (consanguinity)

-reproduction attitude

-acceptance/ refusal of preimplantation or prenatal diagnosis

Analyze the evolution of genetic disorders epidemiology in the population

Evaluate Impact of GC among population

- Do people interact with genetic counselling?

- Do genetic counselling reduce the frequency of handicapped severe genetic/congenital disorders?

Population sample : Tunisian families at risk of genetic disorders and birth defects

- Study carried out at Hereditary & congenital disorders department, Charles Nicolle hospital in Tunis.

- Patients, couples and families are referred from different regions of the country.

Cultural and Social Environment

- Arab (mostly), descent of Berbers [10,000,000]
- Muslim (98%)
- Mean marriage age 25.9y (females) and 32.1y (males).
- Population growth rate is about 0.99% with a birth rate of 15.5 births/1,000 population.
- Life expectancy at birth is 74.89 years.

Cultural and Social Environment

- Education is mandatory ; 98% of children go to school; literacy in total population is 74.3%.
- Contraception is encouraged
- Mean family size is 1.75
- Pregnancy termination for medical reason is allowed.
- Consanguinty rate is 32%

Population referred during 2005

- Patients and families, referred for the first time in 2005 their medical dossier established during the period January 1st to December 31st.
- 2862 patients/families
- 57 new patient/family per week.
- People are coming from different parts of the country, more than 60% from the north.

Patients/Families referred

- Genetic Counselling
- Investigation of a probable Genetic Disease followed by Genetic Counselling
- Prenatal Diagnosis and Genetic Counselling

Impact of GC among Tunisian population

3 Questions

1-Do people ask for genetic counselling?

2-Do people accept & follow genetic counselling?

3-Do people ask and accept prenatal diagnosis and pregnancy termination?

Do people ask for genetic counselling?

- 143 Patients/couples, came to clinics with one question: which risk for my children to have a congenital anomaly/ genetic disorder?

  Out of pregnancy

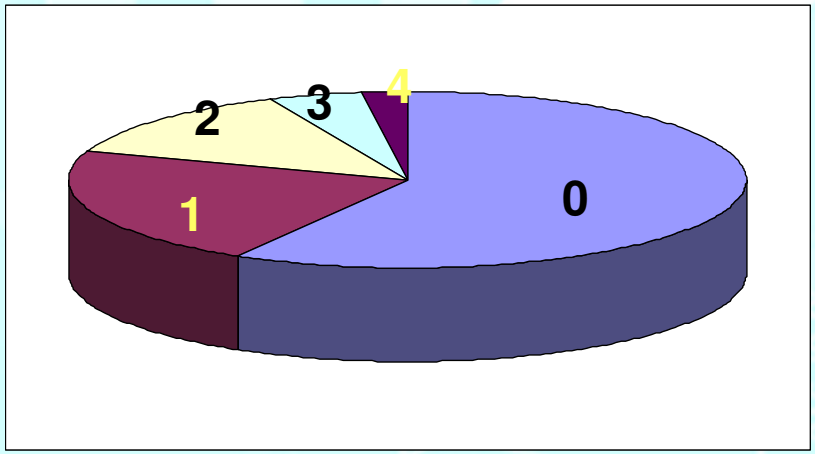
- Patient/couple: own demand for genetic counselling

Why people ask for genetic counselling?

- **Family history**
- **Personal history** (advanced maternal age excluded)
- **Genetic disorder / congenital malformation**

When do they ask for genetic counselling?

- Out of pregnancy
- 55% before conception,
  - preconception
  - premarital
- 45% after abnormal child (fetus) conception.



Family constitution: children number

People ask for genetic counselling

Before conception, they ask about the risk occurrence of genetic disease in their offspring

family history of genetic (or suspected) disease in family members in 64%

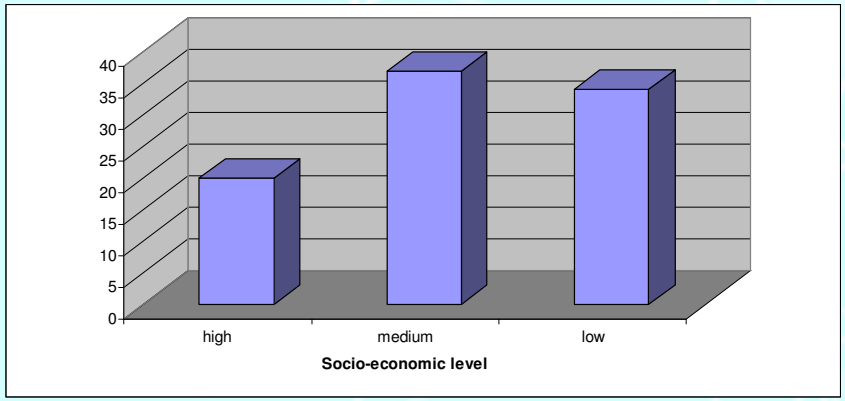
Consanguinity, in 36%

Which pathology required GC?

Chromosomal abnormality	*consanguinity*	Renal disease
Mental retardation	Cerebral malformation	Neurologic disorder
Metabolic disorder	CAH	Genodermatosis
Dysmorphic syndrome	Hemoglobinopathies	Heart disease
Deafness	Neonatal death/miscarriages	Congenital malformation
Ophtalmologic disease	2 associated diseases	Other pathology

Population characteristics ?

- Mean age of parents/couples
  - •Female 29 y (19-43)
  - •Male 36 y (24-56)
- Socio-economic & Education levels
  - – High : 15%
  - – Medium : 41%
  - – Low : 44%



CONCLUSION (1)

- People ask for genetic counseling
- Before reproduction
- Demand comes from different socio-economic levels
- Percentage remains low

2-Do people accept & follow genetic counselling?

Couples at birth defect risk

- 742 couples :
  - Birth defect history
  - Diagnosis of fetal malformation during pregnancy survey

- Birth defects :
  - Major malformations of genetic origin
  - Major malformations of other origin
  - Chromosomal origin: Down syndrome….
  - Genetic disorders without congenital malformations not included.

- All couples received Genetic Counselling related to disease case.

- **Survey of these couples from 2005 to 2007**

- 60% came again to outclinics at least one time
  - To get further information and more details about genetic counselling
  - To ask for prenatal diagnosis
  - To complete medical investigations for propositus or other family's members
- 15% did not come again, no pregnancy planned mostly due to advanced parental age.

11% did not return; they didn't need to do.

14% did not return and we have no valuable information about.

25% do not consider GC as pertinent medical service

Do people follow genetic counselling?

- Genetic counseling provided to families at risk for a defined genetic disorder
  - **Down syndrome** (DS)
  - Congenital adrenal hyperplasia (CAH)
  - Spinal muscular atrophy (SMA)

- Genetic counseling provided to families at risk for a non defined genetic disorder

Down Syndrome

Group 1: 82 patients

DS confirmed for patients born on **2005** and referred to the department.

POST NATAL DIAGNOSIS

Group 2: 29 Affected Fœtus

Confirmed T21 by fetal karyotyping

PRENATAL DIAGNOSIS

Questions

- Did parents of group 1 receive genetic counselling?

- Is there socio-economic difference between group1 and group 2?

Characteristics compared between group 1 and group 2

Socio-economic level	Group 1 (n=82)	Group 2 (n=29)
low	45 %	35%
Medium	41%	30%
High	14%	35%

Residence place	Group 1	Group 2
Grand Tunis	52%	77%
North	48%	23%

Characteristics of group 1 and group 2

Pregnancy follow up		
Reference Centre	Group 1 (%)	Group 2 (%)
University hospital	8	65
Regional hospital	46	13
PHCC	34	14
Private Clinics	37	22
Not followed	9	-

Maternal Age	Group 1 (%)	Group 2 (%)
< 35 years	40	23
≥ 35 years	60	77

Genetic counseling provided & PND proposed ?

Genetic Counselling & PND	Group 1		Group 1 based on maternal age risk	
GC not provided & PND not proposed	77	94 %	44	90%
GC provided & PND refused	5	6 %	5	10 %

CONCLUSION (2)

- Genetic counseling is less provided in PHCC than in university hospital
- Genetic counseling seems underestimated by practitionners
- When genetic counseling is provided people have the choice to accept or refuse PND
- The percentage of people who refuse PND is low

3-Do people ask and accept prenatal diagnosis and pregnancy termination?

Attitude of couples at risk of an autosomal recessive disease

Spinal Muscular Atrophy (SMA)

- severe disease Type I & II
- no treatment available

Congenital Adrenal Hyperplasia (HCS)

-severe disease : SW type
Ambigous genitalia

-treatment available at postnatal and prenatal period

Attitude of couples at risk of an autosomal recessive disease

- Group of 63 families with at least one SMA affected member for whom
  - genetic counselling provided and
  - prenatal diagnosis proposed for further pregnancies

Attitude of couples at risk of an autosomal recessive disease

PND was performed for 78 pregnancies (2002-2007)

- **One time** for the same couple : **68**
- **Two times** for the same couple: **8**
- **Three times** for the same couple: **3**

-Affected fetuses 20 cases

- All pregnancies were terminated except one case because of the result delay.

Attitude of couples at risk of an autosomal recessive disease

- Group of 56 couples, parents of affected CAH patients for whom

- genetic counselling delivered and
- prenatal diagnosis combined with prenatal treatment proposed for further pregnancies.

Attitude of couples at risk of an autosomal recessive disease

- PND performed for 31 pregnancies (1999-2007)
- PND performed 2 times for the same couple: 3 cases

- 8 affected fetuses:
  4 males & 4 females
- Treatment maintained for females fetuses.
- All pregnancies were maintained

CONCLUSION 3

- Genetic counseling diffuse to other family members in case of severe disease
- PND is more needed by parents in case of severe, lethal, uncurable disease (SMA *vs.* CAH).
- Parents ask for PND more than one time when necesary.

GENERAL CONCLUSION

- Genetic counselling remains the best and the most efficient action for genetic diseases prevention
- Success based on people education and practicionners training
- Followed by prenatal or preimplantation diagnosis, genetic counseling is relevant by reducing the incidence of hereditary and congenital disorders.
- Guidelines have to be defined for genetic counseling practice.
- Legislation for pregnancy termination in countries where it is accepted has to be established considering the community culture.