**GENETICS, ENVIRONMENTAL, PRENATAL, BIRTH AND NEWBORN DEVELOPMENT**

**QUESTIONS**

**Q1.** Chromosomes are essential components in the genetic composition of an organism, and so are they in the determination of human sex. In general, a newborn has a set of 46 chromosomes, half of which are inherited from either of the parents. However, not all chromosomes are sex chromosomes, the sex chromosomes are either a combination n of XY (for a boy) or XX (for a girl), Therefore, we can say that the man is responsible for sex determination. The chromosomes also carry the DNA element which in turn carry the genetic material responsible for inheritance. In the human reproductive system, there are two sex gametes namely ovum and spermatozoa, which fuse during fertilization to form a diploid zygote. The fetal development then takes place (Ahmed, 2014. P. 1968).

**Q2**. The genetic make-up of an organism is slightly a complex topic, we, therefore, need to distinguish between specific terms such as phenotype and genotype. Genotype determines the traits of an individual (the traits might not be physically expressed. For example, the genes that determine the eye and hair color of individuals. These are traits that lie within persons. On the other hand, the phenotype is the physical representation of the traits of a person. For example, the visible hair and eye color (Beukeboom & Perrin, 2014, p. 91).

**Q3.** There are many differences between meiosis and mitosis. The meiosis cell division involves two sister chromatids while the mitosis involves non-sister chromatids. In the metaphase stage of meiosis, the chromosomes align themselves at the equator. However, in the mitosis metaphase (i), the homologous chromosomes align at the middle. Similarly, the overall product of meiosis is two daughter cells while the counterpart mitosis gives rise to four daughter cells (Feldman, Rosenthal, & Eidelman, 2014. P. 101).

**Q4.** There are two types of twins namely the dizygotic and monozygotic twins. In the common language, the monozygotic twins are referred to as identical. The dizygotic are called the fraternal twins. In general, monozygotic develop from the same embryo, which was prior fertilized by a single sperm. The dizygotic results from to different embryos and those fertilized by two different sperms. In many cases, the physical appearance of identical twins is very similar such that it is difficult to distinguish them.

**Q5.** Human beings possess gene alleles which are two copies of genes, one copy from either of the parents. In the case of mutation, either or both of the genes copies can be mutated leading to either a heterozygous or a homozygous individual respectively. In many cases, such mutations lead to genetic disorders. The heterozygous individuals are not excessively affected, since only one copy is affected, however, the case if different for their homozygous counterparts. For example, letters BB can be used to represent normal homozygous and bb for affected. On the other hand, Ba can be used to represent the heterozygous individual.

**Q6.** As stated above, genetic mutation often leads to genetic disorders. In cases where one copy is mutated, different patterns are involved. These include; Autosomal dominant which leads to Marfan syndrome. Autosomal recessive where the two copies are copied leading to autosomal recessive disorders such as the sickle cell disorder. In the X-dominant pattern, the X chromosome’s gene is mutated leading to disorders such as Fragile X syndrome. In some cases, one pair of the allele may overshadow the other such that the traits of the ‘other’ are not well represented in the first phenotype. Such cases are referred to those of incomplete dominance (Milunsky, & Milunsky, 2015. P. 147).

**Q7.** Mutation in its broader meaning refers to variations occurring in the genetic formation of an organism, for the purpose of this context. When the variation occurs, it may lead to genetic imprinting. That is, the results of a mutation are dependent on the parent from which the traits were inherited. For instance, the Prader-willie syndrome is a perfect explanation of genetic imprinting. In other cases, polygenic inheritance may occur which involve many factors working together to determine the characteristic of an individual, for example, skin color and height of persons (Van de Zande, & Verhulst, 2014. P. 82).

**Q8.** Congenital malformations refer to functional and structural malfunctions occurring during fetal development which can be attributed to genetic factors. The race and ethnic groups of people, characterized by special traits can pass some of these anomalies to their young ones. For example, the Jews pass anomalies such as Hemophilia C. Similarly, parents connected with blood may give rise to children with intellectual anomalies and increasing the risk of neonatal death (Tardy-Guidollet, et al., 2014, p. 1188).

**Q9.** Trisomy genetic disorder occurs when three bodies of the genetic material from the chromosome of an individual. These three components give rise to the prefix ‘tri’. The subsequent effect is an individual with a plus one chromosome (i.e. an individual with 47 instead of 46 chromosomes). This rare occurrence may lead to disorders such as Patau syndrome, Edward syndromes, and the Down syndrome. It may also lead to child birth defects.

**Q10.** High-risk pregnancies refer to those pregnancies that possess a great risk to either the parent or the child or the both of them. Some genetic conditions are highly related to such condition. Therefore, there is need to attend genetic counseling to understand the underlying risk and how it can be mitigated. For example, cases of the blue-baby are related to genetics and can be stopped through close genetic counseling and treatment. The genetic counselors also recommend the best course of action to the patients (Ball, Bindler, & Cowen, 2013, p. 13).

**Q11.** Technology has come to solve issues of fertility and conception. The in vitro fertilization is a good example where the ovum is retrieved from the ovary of the female and fertilized in the lab. The resulting embryo is then implanted in the uterus and the normal course of fetal development takes place. In the case where the woman cannot sustain a pregnancy, the surrogate motherhood I used to solve the issue. The same IVF procedures take place and the embryo is implanted into the surrogate mother, who carries the pregnancy till birth.

**Q12.** It is important to determine whether the developing child has chromosomal abnormalities. To test for such anomalies, the amniocentesis and CVS (chorionic villus sampling) tests are carried out. The CVS test involves obtaining the placenta contents using a needle and then testing for any abnormalities. On the other hand, Amniocentesis involves extracting some contents of the amniotic sac and testing for abnormalities in the chromosomes. Others test include the trimester screening.

**Q13.** Adoption involves bringing up a child who is not your own and providing for him/her as if it were your own. The pros for adoption include; rescuing a youngster in any form of danger, helping a mother who has difficulties raising a child and raising an adopted child as their your own especially where you cannot give rise to a biological child. The cons include excessive costs, the process in its own nature challenging, you can a highly challenging child and have the problem of acceptance of the child later in life (Keenan, Evans, & Crowley, 2016. P. 367).

**Q14.** The family factors that affect the development of a child include; the father-mother relationship, drinking and substance abuse by the parents, parental negligence, parental love and the kind of interaction between the family and the child. If the parents are caring and loving, the child will grow as a caring and loving child until maturity.

**Q15.** The socioeconomic and environmental factors greatly affect the development of a child. Poverty lowers the self-esteem of a child, increases the probabilities of a child indulging in criminal behaviors and attempting suicide and murder often. However, the opposite is true for children from rich families.

**Q16.**  The society also plays a part in shaping the life of a child, the people, and neighbors, what they do and how they conduct themselves. Peer influence also plays a part in shaping the life of a child. The environment similarly impacts the life of a child. A child brought up in an insecure environment, characterized by violence will probably become violent and arrogant.

**Q17.** The cultural and spiritual orientation of a society and the family greatly affect the development of a child. A child brought up in a morally upright society will develop good morals and healthy interaction with others. The religion also affects the life of the child, a child will always adopt the religion of the parents and society and adhere to the teachings of the religion (Bornstein, & Bradley, 2014, 0. 87).

**Q18.** Some societies advocate more for group survival, interaction and interdependence of the society as one. Such societies are referred to as collectivist societies. On the other hand, some belief in individualistic lives, self-dependency and separate ownership of property. Such societies are called individualistic societies. For example, the American are more of individualistic and capitalist. The Chinese people are collectivists and more of socialists.

**Q19.** The environment and genetic expression of specific traits are greatly interrelated. For example, the polar bear has thick skin and dense fur to secure the body from extreme coldness. The Himalayan rabbits also carry a different gene C which is different from others since it is inactive above 35 degrees centigrade. The African people has high Melanin to protect them from intense sunlight.

**Q20.** The nutrition of a child determines the health status of such a child. Malnutrition in child development is closely related to diseases such as Marasmus which hinder child development. Stress lead to depression disorders which influence the general life of a child till maturity. Pollution effects may include the release of chemicals that may alter the genetic formation of a child, leading to developmental problems.

**Q21.** The female reproductive system consists of the ovaries, oviduct, uterus and the birth canal. There are two ovaries that produce ova which are the eggs that are to be fertilized by the males’ gametes. The ova move to the oviduct also known as the fallopian tube where fertilization occurs. After fertilization has occurred the egg moves to the uterus for implantation and growth of a fetus. If fertilization does not take place the thick uterine wall flows out of the body in form of blood known as the menstrual period. The birth canal commonly known as the vagina is the opening where childbirth takes place.

**Q22.** It is in the fallopian tube that fertilization occurs, which is the combination of female gametocyte with the males’ sperms to form a zygote. The male produces many sperms but only the head of one the cells penetrates the ovum. During penetration, the sperm cell produces an enzyme that breaks the outer layer of the ovum. Fertilization only occurs when the female has ovulated. Ovulation is the monthly release of an oocyte by one of the ovaries. The zygote rolls down from the oviduct to the uterus for implantation.

**Q23.** A zygote consists of forty-six chromosomes from both the male and the female. It is the initial stage of human development. The zygote is a eukaryotic cell meaning that it is single-celled. The zygote stage lasts for about four days. For proper implantation, the zygote converts into a spherical layer of cells known as the blastocyst which contains fluid. It is at this stage chorion and amnion develops. Chorion is a double layered membrane that forms the bigger part of the outer placenta and provides food and oxygen for the developing fetus. The placenta connects the mother and the fetus through an umbilical cord. Amnion is a sac-like membrane that is filled with amniotic fluid and acts as a shock absorber for the fetus.

**Q24.** The germinal stage involves the differentiation of the zygote into multiple cell fragments and full settlement of the zygote in the uterus. This process takes place in fourteen days and is known as mitosis. The cell division is in the multiples of four, eight and sixteen and as it reaches eight cells specific characteristics are observed that determines the nature of the cells. The placenta is formed by the outer cells while the embryo is made of the inner cells. It is at this stage the patient may experience some signs and symptoms such as nausea, cravings for particular food and the breasts begins to become soft and tender.

**Q25.** After the zygote has been implanted and divided into various cells the next stage is the embryonic stage. This stage takes place between the fifth and the tenth week of a pregnancy and the zygote is named an embryo. It is at this stage that significant body organs and structures within the growing human being are formed. This includes an S-shaped tube which becomes the heart, the features of the face, the limbs, sexual organs and the nervous system that is the nerves, the brain, and the spinal cord. The placenta also fully develops which transfers oxygenated blood containing nutrients and water from the mother and excretes waste from the embryo through the umbilical cord. During this period, the patient will start noticing enlargement of the belly though the fetus movements are hardly felt.

**Q26.** Running from the eleventh week to birth is the fetal stage. In this stage, the embryo is known as a fetus and is the last semester of a pregnancy. The organs continue developing such that the heart forms and starts beating and the kidney begins to function. The baby gains more weight and gets some inches longer. Both the fingernails and toenails emerge. The movements of the baby’s muscles can be easily felt. If an ultrasound is conducted at this stage one can determine whether the baby is a boy or a girl. The belly becomes huge and the pregnancy is evident (Kingston., et al., 2014. P. 72).

**Q27.** Lanugo is the thin and fine hair covering the body of the fetus and normally has no color. It appears within the sixteenth week of pregnancy and by the end of the twentieth week, they are in abundance. It disappears before birth but sometimes it is shed a few weeks after birth. Vernix is a white permeable fluid coating a fetus and is usually waxy and creamy. It appears in the twenty-seventh week of the gestation period. It protects the baby from harmful germs and is washed off immediately after birth.

**Q28.** The viability of an infant begins from the twenty-sixth week of the gestation. This is the time where a baby is delivered before nine months and able to live. Before this time, it’s difficult to save the child because the heart doesn’t beat and the pregnancy hormone is rising abnormally. The baby only lives if it is more than five hundred grams.

**Q29.** Teratogens are the harmful substances that inhibit normal development of a fetus. They include drugs, chemicals, and maternal infections. It is the first half of the pregnancy that the infant is vulnerable such that a two weeks old embryo dies in case of teratogens exposure. Teratogens also cause abnormalities in an infant such as mental illness and limb disabilities. There also very high chances of miscarriage and prolonged gestation period.

**Q30.** When an infant is exposed to toxic drugs such as cigarette, alcohol, and heroin there are effects both before and after birth. The baby may have deformities of the hands or legs. The infant can also be born prematurely. After birth, the child delays in crawling, walking, and language development. The infant also has difficulties in sleeping (Berk, 2015. P. 27).

**Q31.** Smoking of cigarettes during pregnancy poses a risk of still birth because the toxin causes separation of the placenta before time. The baby also has had defects such as the cleft lip. The probability of the child dying immediately after birth also increases. The immune system of the baby weakens such that he/she easily falls sick.

**Q32.**Consumption of alcohol by the pregnant mother causes fetal alcohol disorders. These are difficulties faced by the child born by a drunkard mother. A child is born underweight with a small head and short height. In some cases, the baby can be born prior to nine months. The child also risks being alcohol addicts in later stages (Behnke & Smith, 2013, p. 1026).

**Q33.** Exposure to organophosphorus substances inhibits flow cord blood which reduces oxidation and coloration of the infant’s DNA. When a fetus is exposed to radiation there are high chances of getting cancer in later stages of life. Also, radiation can cause damage to brain cells that could trigger brain tumor.

**Q34.** The mother can transfer infections through the placenta to the unborn child or during childbirth. Zika virus which is a sexually transmitted infection increases the risk of birth injury and risks the child brain defects and impaired vision and hearing problems. Syphilis virus in contact with the fetus causes malformation of teeth. Also, an infection such as rubella causes heart disease.

**Q35.** A pregnant mother experiencing stress causes the retarded development of the fetus brain and immune system. After birth, the child becomes distracted and faces a lot of fear. Malnutrition during pregnancy causes malfunctioning of major body organs in an infant. Also getting pregnant in old age of above fifty or very early age of ten years leads to the birth of a child with brain and limb deformities.

**Q36.** Prenatal care is essential to ensure sustaining healthy pregnancies and ensuring the monitored fetal development. It gives the medical professional to reduce the chances of the high-risk pregnancies as well as evaluating methods of mitigating chromosomal abnormalities in developing fetus (Belsky, & Nezworski, 2015, p. 36).

**Q37.** There are several types of child delivery which include; caesarean section, virginal delivery proceeding caesarean, vaginal delivery, forceps delivery and vacuum extraction. Pros of the vaginal natural delivery include reduced risk of excessive after-birth pain and associated illnesses. The cons include tearing of the vaginal tissues and general pelvic weakness. On the other hand, C-section delivery avoids chances of tear and damage of vaginal tissues and post-delivery trauma. However, the cons include infections and excessive after-delivery pain in the section points.

**Q38.** The labor process is divided into three different phases namely; early labor phase, when labor pains initiate till the cervix is 3cm of dilation. The active labor phase characterized by severe labor pains and vigorous opening till the cervix if 7cm of dilation. And finally, Transition phase when the cervix fully opens for delivery. The child is then taken for assessment followed by skin to skin immediate contact (Monk, Georgieff, & Osterholm, 2013, p. 567).

**Q39.** Birth anoxia is a disorder that occurs during childbirth, where the child's brain runs short of oxygen. In such cases, where the brain is deprived of oxygen, there are great brain damages that lead to cerebral palsy. The cells of the brain are damaged at early stages of development and never recover later on (Van Steenwinckel., et al., 2014. p. 887).

**Q40.** Skin to skin contact between the mother and the child in a crucial moment for both parties. It; increases the duration and rate of breastfeeding, helps to reduce negative effects of separation, promotes behaviors related to maternal attachment and ensure proper psychosocial stability. It can be implemented by ensuring that all post-delivery services are delayed till when they are really necessary. The mother should at least breastfeed the child a before the first thirty minutes are over.

**Q41.** Some babies may have a weight of fewer than 5 pounds and eight ounces of weight. These babies are called low birthweight babies. On the other hand, preterm babies are those born before the pregnancy is mature, say, before week 37 of the pregnancy. In the case of the preterm babies, they should be incubated until all the body parts are mature. Then, they need special feeding such as feeding through intravenous lines. They similarly need breathing which can be facilitated through the endotracheal tube. The nurse should attend to the child in set intervals to ensure the child is set in the right position (Wolke, D., Eryigit-Madzwamuse, & Gutbrod, 2014. P. 75).

**Q42.** Newborn assessment is very crucial. It involves checking weight, should be above 6 pounds, matching against the Apgar scoring scale, which checks on vital signs such as muscle tone, color, reflex, breathing rate and the heart rate, checking on the shape of the head, looks at the roof of the mouth, the tongue, the genitals, the arms and the legs, the shape of the abdomen and its diameter as well as the color of the skin (Zhao, et al., 2014. P. 798.

**Q43.** During the skin assessment, the medical professionals examine the texture, color and whether the skin is peeling or intact. They also examine how sticky and the smooth the skin is. The practitioner may also check for some unusual spots and deformations on the skin.

**Q44.** Newborn screening is an important task as it prevents the development of metabolic diseases and other complications that occur at child’s early life. Similarly, glucose monitoring is necessary to avoid later learning complications of individuals and glucose level- associated developmental problems.

**Q45.** In many cases, small babies tend to cry a lot. The parent, therefore, needs to know several soothing techniques that silence a crying child. Such techniques include ‘shushing’ swing, swinging a child, rock-a-bye baby techniques. Other techniques may involve low voice singing to the child.

**Q46.** Some senses are full development in newborn while other are not. The sense of hearing is fully developed and a child responds by kicking the legs or crying in the case of loud noise. However, the sense of sight is not fully developed and grows with time during the first year of birth. The sense of smell is also very high in newborns and they prefer sweet things meaning that the sense of taste is also developed. Similarly, the child’s sense of touch is fully developed at birth.

**Q47.** The first few days after birth are characterized by sadness, mothers feel blue and are overly emotional. The sadness should, however, lass less than two weeks. The first six months are very crucial for mother-child relationship development and that is the time when a child need the motherly care most. It is a crucial time for bonding and psychological development of the child.

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